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Six Papers On Controlled Trading

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Emission Allocation: A Tool for Air Quality Planning. Describes a system for distributing yearly allowable emissions from stationary, area, and population-related sources in Ventura County, California.

An Emission Offset and Banking Regulation for Puget Sound. Puget Sound Emission Banking Experience. Key provisions of banking regulation and status of system after a year of operation.

Emission Reductions from Shutdowns. Explores economic, legal and environmental issues surrounding plant shutdowns. Recommends that all shutdowns be credited and discounted year by year if not used.

Emission Reduction Credits From Solar Energy. Examines cost of energy saving measures, practicality, consistency with Clean Air Act, and administrative demands of creating surplus emission from changing energy use.

Indirect Offsets. Explores idea that new sources could pay an emissions fee to a central agency rather than create their own offsets.

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POLICY ISSUES PAPERS

Emission Allocation: A Tool for Air Quality Planning and Implementation of Reasonable Further Progress - Jan Bush, Janet Lyders, Ventura County Air Pollution Control District

Puget Sound Emissions Banking Experience - Brent Carson, Puget Sound Air Pollution Control Association

An Emission Offset and Banking Regulation for the Puget Sound Region - Brent Carson

Emission Reductions from Shutdowns - Carl Courant, U.S. Environmental Protection Agency

Potential for Generating Emission Reduction Credits from Solar and Energy Conservation - Carol McCoy, U.S. Environmental Protection Agency

Indirect Offsets - Malcolm Weiss and David Foster, U.S. Environmental Protection Agency

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Contents;

EMISSION ALLOCATION: A TOOL FOR AIR QUALITY PLANNING AND IMPLEMENTATION OF REASONABLE FURTHER PROGRESS

[illegible]

This paper describes a system developed for the 1979 Ventura County Air Quality **Management** Plan by the following individuals of the Ventura County Air Pollution **Control** District:

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The paper was written by Jan Bush and Janet Lyders for presentation to the Air Pollution Control Association Annual Meeting, June 22-27, 1980.

ABSTRACT FOR ANNUAL MEETING PAPER NUMBER 80-46.4

EMISSION ALLOCATION: A TOOL FOR AIR QUALITY PLANNING AND IMPLEMENTATION OF REASONABLE FURTHER PROGRESS, Jan Bush and Janet Lyders, Ventura County Air Pollution Control District, 800 South Victoria Avenue, Ventura, CA 93009

The information presented in this paper is directed to air pollution planning and regulatory agencies. A system for distributing yearly allowable emissions from stationary, area and population-related sources throughout Ventura County, California is described. The emission allocations identify the growth accommodated from various emission categories and concurrent emission reductions necessary to achieve the Federal air quality standards. This emission allocation system also serves to implement equitable and realistically Reasonable Further Progress (RFP) toward attainment of the standards. Control and monitoring of population-related emission sources through land use management programs initiated by general purpose governments is discussed as an element of the system, followed by a description of a method for allocating stationary source emissions through implementation of the County's New Source Review (NSR) Rule. It is concluded that the allocation system as implemented by Ventura County may be an appropriate tool for planning, implementing and monitoring RFP in other similar non-attainment areas.

EMISSION ALLOCATION: A TOOL FOR AIR QUALITY PLANNING AND IMPLEMENTATION OF REASONABLE FURTHER PROGRESS

Jan Bush, Air Pollution Control District, Ventura County, California
Janet Lyders, Air Pollution Control District, Ventura County, California

Background

Conceptually, an emission allocation system is an air quality planning tool which prescribes levels of emissions of air pollutants to defined geographic areas. This concept has been refined and adopted as an integral part of Ventura County's 1979 Air Quality Management Plan. The Ventura County Emission Allocation System responds to several requirements of the Clean Air Act of 1977 (CAA) as well as to the county's specific air pollution characteristics.

Ventura County is designated as a non-attainment area for ozone and particulate matter, and as an attainment or unclassified area for the other pollutants. The county is located in Southern California adjacent to Los Angeles County and the South Coast Air Basin. Because the oxidant problem is the most severe pollutant problem, it is the primary concern of the District's program.

The District was co-designated the Nonattainment Planning Agency for the county along with the Southern California Association of Governments (SCAG). Through a mutual agreement, the District has sole planning authority for developing the Air Quality Management Plan (AQMP Non-Attainment Plan), but it works with SCAG to assure reasonable consistency between the AQMPs for both areas.

The development of the Emission Allocation System as the backbone of the Ventura County AQMP was not anticipated at the outset of the planning process, but rather it evolved as the logical mechanism to implement the AQMP because of certain characteristics of Ventura County. Ventura County is very similar to the South Coast Air Basin of Southern California in that it has a coastal plain surrounded on three sides by mountains with the ocean on the fourth. The prevailing daytime windflow is off the ocean with nighttime drainage winds in the opposite direction. In the summertime there are low and persistent inversions which frequently result in high ozone buildup.

The reactive hydrocarbons (RHC) and oxides of nitrogen (NOx) emission inventory for the county shows that industrial sources account for about 50% of the RHC and 60% of the NOx with mobile and areawide sources providing the remainder. The major industrial sources in the county are primarily limited to two power plants and substantial oil production, excluding major refineries. The other sources are either minor or "area" industrial sources. These latter sources are typical of the type of industial growth expected in the future.

The Clean Air Act of 1977 requires that the ozone standard be achieved by 1987 with at least annual linear reductions. The Act further requires that anticipated growth be built into the plan and mitigated so as not to jeopardize the 1987 achievement date. Additionally, the

Act requires a mechanism - New Source Review (NSR) - to assure management of emission growth. EPA has promulgated its NSR regulation for the latter purpose with delegation available to local agencies upon adoption of an equivalent local rule. Herein lies the crux of the county's problem. If the county's economic growth continues at its recent rate, there will be significant growth in emissions unconstrained by the NSR regulation. Since NSR only affects large sources, the majority of the county's growth would be exempt from EPA's review. Yet Best Available Control Technology (BACT) could be cost effectively applied to these small sources.

small sources

Problems would also arise if the exemptions to the NSR regulation were reduced so that it also applied to small sources. Under NSR, emission increases after application of BACT are to be offset by equivalent reductions from other sources. Existing sources in Ventura County, even the small ones, have been effectively controlled over the last four years to BACT, or at least RACT, through continued development of more stringent regulations as technology became available. Few tradeoffs, therefore, exist. An added problem is that there is substantial growth potential for existing permitted sources because permits have traditionally been issued to equipment which meets certain specified (by regulation) emission limits. In many cases these limits are a function of process rate (pounds per million pounds process weight), flow rate (pounds per million BTUs), concentration (ppm), etc. and are not based on a time increment (pounds per hour, tons per year, etc.). As a practical matter, this uncontrolled growth potential could adversely impact achievement of RFP unless anticipated and mitigated.

no offsets

permit limits
f (input)
no output limits

As problems related to controlling industrial source emissions emerged, another aspect of the air quality problem became more clearly defined. Ventura County has a population of approximately 500,000 people, and it is growing at one of the highest rates in the state, largely due to its proximity to Los Angeles. Because of a relatively small population in communities which are spread throughout the county, it lacks any significant transportation alternatives to the car. As a bedroom community for Los Angeles, the county has a comparatively high vehicle-miles-travelled (VMT) per person. As a result, controlling vehicular emissions is an important factor in solving the county's air quality problem. However, with a high growth rate and inadequate transportation alternatives, vehicular emissions are expected to increase as a proportion of overall emissions despite increased vehicular emission constraints for new cars in California.

cars?

The final element of the air quality problem is also related to the county's proximity to Los Angeles. A major San Francisco - Los Angeles trucking artery runs through the county. This same artery serves as a major corridor for recreation bound Los Angeles residents heading for less crowded weekend retreats to the north. While Ventura County can control its population related emissions by controlling its population growth through land use measures, it cannot control traffic passing through the county on its public highways. Fortunately, this aspect of the problem is comparatively minor, and emission growth forecasts for through-traffic are low.

trucks?
(c)

The planning process utilized to develop the AQMP was also used to develop a regional transportation plan and a water quality management plan (208). The basis for all of these plans is a countywide population and land use plan. Each of the nine cities and the County had specific ideas for dealing with population growth within the context of these various planning efforts. As a result, each jurisdiction was allocated specific population growth forecasts to implement in accordance with local planning needs. Many of the cities have subsequently adopted growth management ordinances to implement their forecasts. This assures consistency between the AQMP and Section 316 of the CAA regarding sewage treatment plant grants.

Given the aforementioned Clean Air Act requirements, the county's air pollution characteristics and the nature of its planning process, an emission allocation system emerged as a logical approach to air quality planning. The system is explained in detail below.

Description

The Ventura County Emission Allocation System (1) prescribes annual levels of emission growth from existing and new sources; (2) identifies annual reductions resulting from air pollution controls; and (3) assigns these values to 22 growth and non-growth areas in the county. The annual incremental reductions necessary to meet the Reasonable Further Progress (RFP) Requirements of the CAA establishes the parameter for the annual levels. Projected emission growth is mitigated by those emission controls necessary to remain within the annual levels. Thus, emission growth that is consistent with the allocations also meets RFP. At this time, the system only applies to the precursors to ozone: RHC and NOx.

Specifically, the system (Table 1):

1. Defines baseline emissions (1977);
2. Identifies annual emission growth from population-related, stationary and miscellaneous sources;
3. Identifies annual emission reductions resulting from air pollution controls; and
4. Identifies total annual emission growth each subarea can accommodate while still remaining within RFP requirements.

Emission Allocation System - Geographic Distribution

Emissions are allocated to the same statistical areas used in the countywide population and land use plan. In general, these boundaries were found to be reasonable for defining air sheds for modeling purposes. Emissions are distributed among Growth Areas (GA) and Non-Growth Areas (NGA) comprising the nonattainment area (Figure 1). Growth Areas consist of aggregations of "Analysis Zones" (AZ). An AZ is an area with similar land uses and/or socioeconomic characteristics, separated from contiguous AZs by natural, geographic barriers and by man-made structures such as roadways and parks. Analysis Zones within

5<

a particular GA are those AZs in which most area development is expected to occur in the community as a whole. A GA does not define the limits of urbanization; rather, it is an area that will contain a projected amount of urbanization somewhere within its boundaries. Non-Growth Areas comprise those areas in which limited growth is anticipated and in which corresponding growth in emissions is expected to be slight.

Since the statistical areas used for the emission allocation system are those used for census data, substantial amounts of information are available for forecasting economic and land use activities.

Emission Allocation System Categories

Sources of RHC and NOx emissions are divided into three categories for allocation purposes: (1) sources closely related to population, (2) stationary sources, and (3) "other" sources. The following sources are included in the "population-related" category: motor vehicles, organic solvent usage, residential pesticide usage, domestic heating equipment and minor miscellaneous area sources such as lawn mowers. Motor vehicle emissions account for most of the population-related emissions. Emission allocations for stationary sources include all sources under an Air Pollution Control District Permit. In Ventura County, this includes stationary sources as small as one ton per year. The "other" category includes emissions from through-traffic on county highways, medium and heavy duty vehicles, agricultural operations, aircraft, railroads, ships, off-road vehicles, and recreational boats.

Emission Inventory and Growth and Control Forecasts

Existing "population-related" emissions were derived from the emission inventory. Transportation models, emission factors for motor vehicles and the AQMP population forecasts were used to determine emission growth for this category. Emission reductions resulting from controls on motor vehicle emissions and certain area sources and implementation of a vehicle inspection maintenance program were projected. The reductions were allocated in accordance with the projected population distribution, transportation models and time schedules for implementing controls.

Emission allocations for stationary sources were developed on the basis of the location of existing sources, the amount of RHC and NOx generated by these sources, and forecasts of source growth and control. Forecasts were developed from APCD, California Air Resources Board (ARB) and U.S. Environmental Protection Agency (EPA) studies and countywide economic forecasts. Emission reductions resulting from implementation of EPA and ARB required controls were allocated in accordance with the geographic distribution of the sources and time schedules for implementing controls.

Projection methodologies for the "other" sources category were developed from the emission inventory, EPA mobile emission factors, population forecasts for Los Angeles and Ventura Counties and economic forecasts. Emissions were allocated to subareas on the basis of existing activities and projected changes in these activities. Since there are no local regulatory avenues available to control growth in this category, emission reductions resulting from controls were not developed.

Data regarding the emission inventory and growth and control forecasts were used to solve the following emission forecasting equation for each year for each subarea:

$$E_{(n+1)} = E_{(n)} + E_G - E_C$$

$E_{(n+1)}$ equals future year emissions; $E_{(n)}$ equals baseyear emissions; E_G equals emissions growth and E_C equals emissions controlled. When calculations are repeated for each year from the 1977 baseyear inventory to the 1987 target year, E_G for each year becomes the emission growth allocation for that year. This number is the summation of growth for all three source categories.

The yearly emission growth allocations fall within the RFP requirements assuming implementation of local population forecasts, all ARB and EPA required Reasonable Available Control Measures (RACMs) and pesticide controls. If, however, population forecasts are exceeded or revised upward or applicable controls are not implemented on schedule, the system will be revised by decreasing stationary source emission growth and/or increasing controls on stationary sources and transportation. Finally, the emission allocation system permits the carryover to the following year of unused allocations.

Implementation of Emission Allocation System

Implementation of the emission allocation system rests with the County of Ventura as a general purpose government, the Air Pollution Control Board (Board of Supervisors) and the nine cities within the county.

Population-Related Emissions

Control of population-related emissions falls within the jurisdiction of the County and local cities as part of their land use planning functions. As noted previously, several local jurisdictions have adopted or are considering adoption of growth management ordinances or policies consistent with the AQMP population forecasts.

Stationary Source Emissions

Stationary source emissions are implemented through the New Source Review Rule. The Rule incorporates procedures to deal with the problems previously identified with applying the EPA NSR regulation to Ventura County. First, the rule applies to all sources required to obtain a construction and operating permit from the APCD. For Ventura County this includes nearly all sources larger than one ton a year. Secondly, all existing permits expire upon renewal after January 1, 1980, whereupon they are conditioned to a maximum permissible emission rate.

NSR
all sources
≥ 1 tpy

after 1/1/80
[illegible] [illegible]
in permit

7<

That rate is based on the maximum emission rate during the last five years in terms of pounds per hour and tons per year or a lesser amount agreeable to the applicant. It is important to note that the District has an annual emission fee rule, and the fee is based on the permitted rather than the actual rate. Thus, the fee provides an incentive to minimize the permitted rate. All growth above this rate must be deducted from the emission allocation for the area.

Prior to approval, APCD permit applications for new or modified sources must be found to fall within the annual stationary source emission allocation for the applicable geographic area. If an allocation is unavailable, an applicant can utilize allocations from other adjacent areas in accordance with tradeoff provisions of the Rule. Tradeoffs are not necessarily on a one to one basis and are dependent upon the air quality relationship of the two areas. Flexibility is also provided when allocations are unavailable by allowing for offsets if they are available. If emissions from a source are voluntarily controlled or operations are terminated in part or in whole, the emissions can be "banked" for future growth. Banked emissions can be used by the source creating the bank or transferred to another source. Applicants having banked emissions must utilize them prior to using the area allocation.

Monitoring Reasonable Further Progress

Because the Emission Allocation System is so comprehensive, determining annual RFP is a simple matter. The system accommodates continual identification of stationary source emission growth and control. The allocation tables are adjusted each time a permit is processed. As control strategies are adopted, maximum permissible emission rates on permits of the affected industries are reduced. Population-related emission allocations are adjusted annually based on population estimates prepared by the Ventura County Planning Department and California Department of Finance. Control effectiveness is reassessed annually, and the system is revised accordingly. "Other" source emissions are monitored periodically through analysis of applicable data and updated as needed.

Conclusion

The emission allocation system resulted from extensive negotiations with local jurisdictions and industry. It is worthy to note that its adoption was supported by industry after nearly two years of development. Because of ongoing changes in air pollution control technology and emission growth forecasts, the AQMP and the emission allocation system will be amended every two years. Since such changes are expected to be minor, the emission allocation system will provide a degree of long range planning certainty.

While the emission allocation system may be somewhat complex, it provides a quantified method for determining emission growth consistent with CAA requirements. Additionally, the system specifically identifies responsibilities of applicable local agencies and industry in implementing the AQMP. A clear identification of responsibilities enhances accountability, as well. Thus the emission allocation system provides concerned citizens with a tool to measure progress of the county's air quality planning efforts.

TABLE I

EMISSION GROWTH WITH REASONABLE FURTHER PROGRESS (RFP) AND ATTAINMENT OF THE OXIDANT STANDARD

REACTIVE HYDROCARBONS (RHC), TONS PER YEAR (TPY)

AREA	1977	1978						1979						1980						1981						1982						1987
	Total Emissions	Population Related		Stationary		Other	Total Emissions	Population Related		Stationary		Other	Total Emissions	Population Related		Stationary		Other	Total Emissions	Population Related		Stationary		Other	Total Emissions	Population Related		Stationary		Other	Total Emissions	Total Emissions
		Growth	Controls[1]	Growth	Controls[1]	Growth[1]		Growth	Controls	Growth	Controls[1]	Growth		Growth	Controls	Growth	Controls	Growth[1]		Growth	Controls	Growth	Controls[1]	Growth[1]		Growth	Controls	Growth	Controls[1]	Growth[1]		
Ojai GA[2]	785	18	50	1.9	5	-2.2	748	26	52	3	6	-2.9	716	12	68	2.1	13	-1.4	647	1.3	126	9	11	-11	509	1.3	73	20	19	-8	430	285
Ojai NG[2]	583	1.2	13	6	0.1	-15	561	7	19	19	11	-13	545	0.7	18	20	8	-6	534	0.3	29	172	20	-37	619	0.3	17	235	40	-38	760	810
San Buenaventura GA	5165	72	204	11	111	-21	4912	111	266	48	385	-34	4386	142	258	39	129	-25	4155	30	575	29	131	-98	3410	29	422	65	135	-57	2890	2054
San Buenaventura NG	1244	1.3	5	6	49	-30	1167	0.8	8	19	114	-30	1036	1.1	4.6	19	73	-23	944	1	11	13	63	-79	816	1	7	11	59	-56	706	490
Santa Paula GA	1031	14	52	1.4	6.2	-8	980	58	76	17	12	-13	954	13	77	4.6	14	-5	875	3	138	1.5	13	-33	696	4.3	83	1.3	12	-28	575	404
Santa Paula NG	496	0.3	2.9	0.4	2.3	-16	475	0.9	3.8	1.3	11	-14	449	0	4.1	1.3	6	-6	434	0	13	0.8	5.1	-41	376	0	5	0.8	5	-42	325	269
RSA 2 Totals	9304	108	327	27	174	-91	8847	204	425	107	539	-107	8087	170	431	86	243	-68	7589	36	891	224	243	-299	6426	36	607	333	269	-229	5686	4329
Camarillo GA	2324	155	103	8	8	-59	2318	101	122	18	18	-40	2257	159	198	19	20	-33	2182	186	414	11	20	-105	1852	69	330	2.2	18	-69	1506	1012
Camarillo NG	1860	8	12	1.3	3.7	-103	1751	9	22	4.5	22	-81	1639	10	23	4	12	-41	1589	2.9	41	3	10	-198	1355	15	26	2.6	10	-202	1135	717
Oxnard GA	6477	158	272	25	25	-34	6329	57	289	69	49	-44	6073	199	377	93	67	-44	5866	157	777	63	72	-162	[illegible]	45	540	39	59	-100	4426	3400
Oxnard NG	789	0	10	1	2.7	-28	750	0	13	3.3	12	-49	679	0	9	3.3	8	-13	646	0	31	2.3	7	-61	550	0	14	2.1	7	-68	463	298
Port Hueneme GA[3]	650	196	56	11	4.1	0	796	0	66	0	5	-0.9	724	0	79	0	9	-0.6	636	0	137	0	8	-7	484	0	79	0	7	-2.8	395	251
Silverstrand[4]	27	0.1	3	0	0	0	24	0.1	2	0	0	0	22	0.1	2	0	0	0	20	0.1	5	0	0	0	15	0.1	3	0	0	0	12	9
RSA 3 Totals	12127	517	456	46	44	-224	11968	167	514	95	106	-216	11394	368	687	119	115	-131	10939	347	1405	79	116	-533	9297	128	992	46	102	-442	7937	5635
Moorpark GA	215	34	10	1.4	0.9	-1.4	242	25	17	3.6	3	0.9	252	47	21	2.7	2	-2.4	276	6	42	1.1	2	-13	227	28	38	2.5	2.6	-12	205	229
Moorpark NG	104	0.1	0.2	1	1	-4.8	99	0	0	3.3	1.3	-4.1	97	0	0	3.3	1.1	-2	97	0	0	2.3	1.1	-12	86	0	0	2.1	1.1	-13	74	44
Simi Valley GA	1923	23	109	2.8	13	-3.8	1822	57	141	29	22	-14	1731	40	159	15	29	-6	1583	40	356	10	28	-25	1233	37	189	8	27	-12	1050	768
Simi Valley NG	37	0.2	0.6	1.1	1.4	0	36	0.2	0.8	3.6	3.9	0	35	0.2	0.9	3.6	2.2	0	36	0.2	2	2.6	2	0	35	0.2	1.4	2.2	2.2	0	38	26
RSA 4 Totals	2283	57	120	6	16	-10	2199	83	159	40	30	-17	2115	87	182	24	34	-10	1991	46	401	16	33	-50	1581	66	255	15	33	-37	1357	1067
Oak Park GA	85	21	9	0	0	0	97	24	13	0	0	0	107	23	29	0	0	0	101	19	36	0	0	0	84	20	26	0	0	0	79	75
Thousand Oaks GA	2884	154	183	13	17	-12	2839	154	204	37	22	-26	2778	149	285	26	49	-19	2596	134	560	27	49	-52	2100	90	454	16	48	-42	1666	1217
Thousand Oaks NG	197	4.3	0.8	0	0	-9	191	3.4	2.5	0	0	-12	181	3.6	5	0	0	-4.9	174	3.6	9	0	0	-15	155	3.5	6	0	0	-23	130	73
RSA 5 Totals	3166	179	193	13	17	-21	3127	181	219	37	22	-38	3066	175	320	26	49	-24	2870	157	605	27	49	-66	2339	114	485	16	48	-65	1875	1365
Fillmore GA	586	11	33	2	3.4	-0.9	561	10	46	7	19	-3.8	510	10	42	6	9	-2.1	473	10	91	3.8	11	-13	372	10	51	3.5	11	-7	317	236
Fillmore NG	402	1.7	9	4.4	7	-5	386	1.4	11	15	24	-4.6	363	0	10	15	14	-4	347	0	20	10	12	-14	315	0	10	9	13	-14	287	240
Piru GA	130	0.1	3	2.6	1.5	-0.6	127	0	4	9	1.2	-0.6	131	0	3.5	9	9	-0.2	127	0	6	6	9	-2.2	116	0	3.5	5	10	-2.1	101	97
Piru NG	211	0.1	0.7	0.7	2.4	-1.1	208	0.1	1.3	2.4	22	-0.9	185	0	1.2	2.4	12	-0.4	174	0	0.7	1.6	9	-3	163	0	1.1	1.3	12	-3	148	138
RSA 6 Totals	1329	13	46	10	14	-8	1283	11	62	33	66	-10	1189	10	57	32	45	-1.3	1121	10	118	22	40	-32	966	10	65	19	46	-26	853	711
TOTAL COUNTY	28208	874	1142	102	264	-354	27424	646	1379	311	763	-387	25851	811	1677	285	488	-233	24572	596	3420	369	480	-980	20610	354	2404	430	499	-796	17714	13106
REQUIRED TO MEET REASONABLE FURTHER PROGRESS													28200						26100						24100						22000	11600
REQUIRED FOR ATTAINMENT													11600						11600						11600						11600	11600

1. Includes both controls and emission declines due to declining industries.
2. GA - Growth Area; NG - Nongrowth Area.
3. Excludes any emissions generated at the U.S. Naval Facility.
4. Not allocated to Growth Area, pending LAFCO resolution.

NOTE: If the allocations for any area are less than 0.1 TPY but greater than 0, then 0.1 is assigned.

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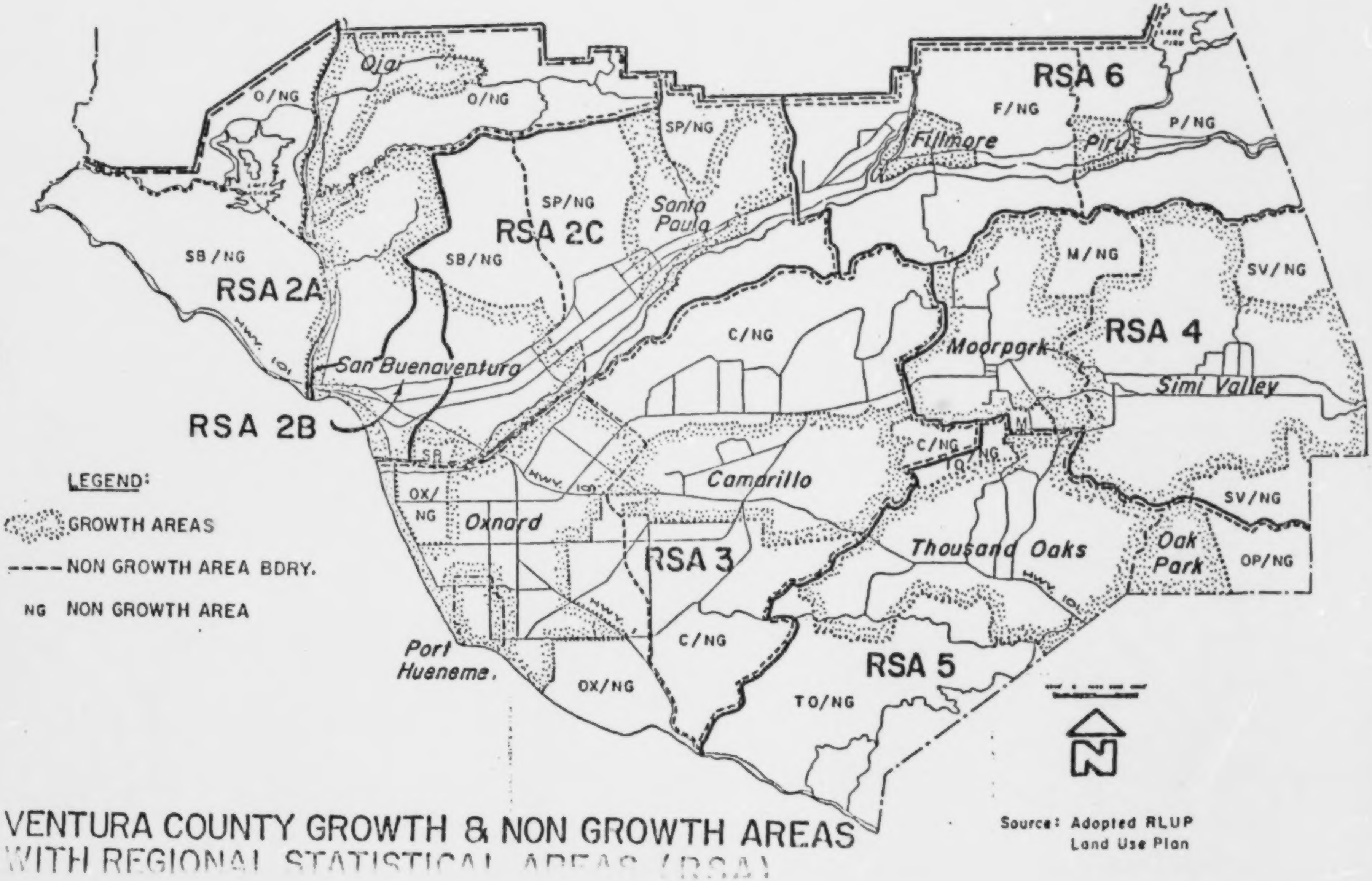
FIGURE I


RSA 6
F/NG
P/NG
Fillmore
Piru
O/NG
Ojai
O/NG
SP/NG
SP/NG
Santa Paula
RSA 2C
SB/NG
SB/NG
RSA 2A
HWY. 101
San Buenaventura
RSA 2B
M/NG
SV/NG
RSA 4
Moorpark
Simi Valley
C/NG
C/NG
TO NG
M
Camarillo
SB
OX/ NG
Oxnard
HWY. 101
RSA 3
HWY. 1
Thousand Oaks
HWY. 101
Oak Park
SV/NG
OP/NG
C/NG
Port Hueneme.
OX/NG
RSA 5
TO/NG
N
LEGEND:
GROWTH AREAS
NON GROWTH AREA BDRY.
NG NON GROWTH AREA

VENTURA COUNTY GROWTH & NON GROWTH AREAS
WITH REGIONAL STATISTICAL AREAS (RSA)

Source: Adopted RLUP
Land Use Plan

STATIONARY SOURCE
EMISSION ALLOCATION
TONS PER YEAR (TPY)

AREA	NITROGEN OXIDES (NOX)					VOLATILE ORGANIC COMPOUNDS (VOC)				
	BANKED	CARRY OVER	1980	1981	1982	BANKED	CARRY OVER	1980	1981	1982
OJAI GA		2.1 / .7	1.1 / .4	12.0 / 4.0	19.5 / 6.5			1.6 / .5	6.7 / 2.3	15.0 / 5.0
OJAI NG		15.8 /	16.7 /	228.7 / 76.3	371.2 / 123.8			13.1 /	129.0 / 43.0	176.2 / 58.8
VENTURA GA-1		18.3 / 6.0	12.0 / 4.0	12.0 / 4.0	12.0 / 4.0		1.8 /	12.0 / 2.4	11.8 / 4.0	33.7 / 11.3
VENTURA GA-2		8.8 / 2.9		2.5 / .9	2.5 / .9	5.8	16.2 / 2.6	3.8 /	1.4 / 1.2	1.5 / .5
VENTURA GA-3		4.3 /		1.4 / .5	1.4 / .5		10.2 / 3.2	7.0 / 2.4	6.4 / 2.2	13.5 / 4.5
VENTURA NG-1		31.5 / 7.8	15.7 / 5.3	15.7 / 5.3	15.7 / 5.3		18.8 / 4.1	14.3 / 2.3	9.7 / 3.3	8.2 / 2.8
VENTURA NG-2										
SANTA PAULA GA				1.7 / .6	1.7 / .6	0.9	5.1 /		1.1 / .4	1.0 / .3
SANTA PAULA NG				1.3 / .4	1.3 / .4				.6 / .2	.1 /
CAMARILLO GA		10.7 / 1.8		5.4 / 1.8	5.4 / 1.8		19.8 / 2.9	14.2 / 4.7	8.2 / 2.8	1.6 / .6
CAMARILLO NG		7.4 / 2.3		3.7 / 1.2	3.7 / 1.2		4.4 / .3	3.0 / 1.0	2.2 / .8	1.9 / .7
OXNARD GA	0.1	116.9 / 34.9	102.7 / 21.9	/ 34.3	102.7 / 34.3	2.2	51.7 / 14.6	69.7 / 15.0	47.2 / 6.8	29.0 / 10.0
OXNARD NG		5.6 / 1.8	2.8 / .9	2.8 / .9	2.8 / .9		3.2 / .8	2.5 / .8	1.7 / .6	1.6 / .5
PORT HUENEME GA		3.6 / 1.2	1.8 / .6	1.8 / .6	1.8 / .6		8.3 / 2.6			
MOORPARK GA			.4 / .1	.4 / .1	.4 / .1			2.0 / .7	.8 / .3	1.9 / .6
MOORPARK NG			.3 / .1	.3 / .1	.3 / .1		3.2 / .2	2.5 / .8	1.7 / .6	1.6 / .5
SIMI VALLEY GA		6.4 /	6.0 / 2.0	6.0 / 2.0	6.2 / 2.1	2.0	21.8 / 5.9	11.2 / 3.8	7.5 / 2.5	6.0 / 2.0
SIMI VALLEY NG			.2 / .1	.2 / .1	.2 / .1		3.5 / .7	2.7 / .9	1.9 / .7	1.6 / .6
OAK PARK GA										
THOUSAND OAK GA		3.0 / .6	1.7 / .3	1.3 / .4	1.3 / .4		31.7 / 9.2	19.5 / 6.5	20.2 / 6.8	12.0 / 4.0
THOUSAND OAK NG										
FILLMORE GA				1.3 / .4		1.8	5.3 / 1.7	4.5 / 1.4	2.7 / 1.0	2.6 / .9
FILLMORE NG		6.2 / 1.3		3.1 / 1.0	3.1 / 1.0		6.4 /	9.5 /	7.5 / 2.5	6.7 / 2.3
PIRU GA							8.7 / 2.4	2.1 /	4.5 / 1.5	3.7 / 1.3
PIRU NG		1.0 / .4		.5 / .2	.5 / .2		2.3 / .8		1.2 / .4	1.0 / .3
TOTALS	0.1	241.6 / 61.7	161.4 / 35.7	302.1 / 135.1	553.2 / 184.8		222.4 / 52.0	195.0 / 43.2	274.0 / 83.9	320.4 / 107.5

* / **

* Emissions Allocated to Large Sources (≥ 10 Lbs/Hr)
** Emissions Allocated to Small Sources (< 10 Lbs/Hr)

ADJUSTED AS OF
5/30/80

AN EMISSION OFFSET AND BANKING REGULATION FOR THE PUGET SOUND REGION

BY

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For Presentation at The Annual Meeting of
The Pacific Northwest International Section of
The Air Pollution Control Association

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AN EMISSION OFFSET AND BANKING REGULATION FOR THE PUGET SOUND REGION

INTRODUCTION

How is it possible to get economic growth and clean air in urban areas? The Board of Directors of the Puget Sound Air Pollution Control Agency believes that the answer lies in its offset and banking program, enacted on June 12, 1980. This program requires any new source which will significantly increase air pollution in an area violating clean air standards to obtain offsetting emission reductions before it begins to operate. The regulation also allows existing sources of air pollution to reduce their emissions and receive a credit. Emission reduction credits can be saved or "banked" and used by the firm to offset emissions from an expansion or sold to a new company in need of offsets.

This paper describes the key provisions of the adopted regulation and reviews the status of the program. The major issues raised during the development of the rule are discussed along with how these concerns were resolved.

BACKGROUND

The mid 1970's saw increasing demand for industrial expansion in areas of the country already having health threatening levels of air pollution. This raised several questions. Can economic growth be compatible with clean air? What steps could insure progress to clean up existing pollution while making room for new firms? How could existing industries prepare for their future, knowing that an expansion meant more pollution?

Answers at the federal level came first in the form of informal policies then as government regulations and finally legislation. They focused on a mechanism to accommodate industrial growth while reducing air pollution. The mechanism was known as emission offsets and banking.

The history of emission offsets and banking is best described by Richard Liroff of the Conservation Foundation (1). Briefly, in 1975 the United States Environmental Protection Agency (EPA) Region IX office adopted a policy requiring offsetting emission reductions as a way to accommodate new California industries. The policy stemmed from the desires of the SOHIO company to build an oil pipeline terminal in Long Beach. In December, 1976 EPA headquarters promulgated their first Emission Offset Interpretative Ruling (2). The Ruling allowed a new major source (basically, 100 tons/year) to operate in an area violating a national ambient air quality standard (NAAQS), known as a nonattainment area, if that company reduced existing pollution levels to more than offset their expected pollution increase. The new source also had to install controls so as to limit pollution to the Lowest Achievable Emission Rate (LAER).

In August, 1977 Congress amended the 1970 Clean Air Act (3). The amendments established a clear mandate for all areas of the nation to meet the NAAQS for all pollutants as quickly as possible, but no later than 1982 or in the case of motor vehicle pollutants by 1987. All existing pollution sources in nonattainment areas were to install Reasonably Available Control Technology (RACT) while new sources needed LAER. The amendments incorporated EPA's offset policy with minor changes, but required each state to develop by July, 1979, their own permit program for new sources locating in nonattainment areas.

In January, 1979 EPA revised its Interpretative Ruling (4). The changes addressed the Clean Air Act Amendments and comments on the first Ruling. The major revision in the Rule was the allowance of offset banking. Previously prohibited by EPA, banking would allow the saving of emission reductions which went beyong required control levels. These saved or banked reductions could be used for a future expansion which needed offsets. No rules were established concerning the selling, trading or marketing aspects of a banking system. EPA's new Ruling, consistent with the Act, would only apply until states prepared their own regulations and incorporated them into an acceptable plan.

As EPA was issuing its revised Ruling, the Puget Sound Air Pollution Control Agency (PSAPCA) had just completed preparation and adoption of a recommended revision to the State Air Quality Implementation Plan (SIP). The SIP is the document detailing how air quality standards will be met and maintained. PSAPCA, an autonomous four county agency, governed by a nine member Board of local elected officials, had been designated as lead agency for developing the local components of the SIP. After reviewing EPA's new Ruling, PSAPCA began to investigate the issues surrounding an emission offset and banking program with the goal of adopting a program by July, 1979.

It became apparent that the complexities of offsets and banking demanded more time for consideration and resolution of the issues. With the help of a small supplemental grant, drafting began on a regulation. The proposed regulation was published in February, 1980 after considerable review and revision by a technical Advisory Committee and a Citizens Committee. Following three public hearings and further modifications, a final regulation was adopted by PSAPCA's Board.

The following section describes in more detail the process through which the regulation was developed.

DEVELOPMENT OF THE REGULATION

Offsets vs. Growth Margin

As mentioned previously, Congress required a permit program to be developed for new sources wishing to locate in nonattainment areas. While never specifically using the term "offsets", Section 173 of the Act required the adoption of either an offset provision or establishment of a growth margin to accommodate new industries. The first question that had to be addressed was whether to adopt a growth margin or proceed with an offset program.

A growth margin is simply a quantity of pollution allowed to be added to an area over some period of time. Technically, a growth margin can be set without much evaluation, but to establish it at the correct level and to track consumption of this increment is very difficult. Moreover, the policy issues surrounding a growth margin raised the most concerns. For one, there was the possibility of a single source using up the entire growth margin in one action. Another question was whether existing companies should be forced, without compensation, to reduce emissions beyond RACT in order to create a margin for growth. An offset policy, on the other hand, put the burden, financial and otherwise, on a new company to reduce existing emissions.

Why Banking?

An offset program was preferable to a growth margin approach: but why have a banking program? No federal law or regulation had required the development of a banking program, few areas had established banking rules, and an offset program could function without a banking component. The answer was the obvious benefits which banking offered.

Among the potential benefits that banking can provide, the greatest may be reduction of the uncertainty for firms wishing to enter or expand in a non-attainment area. Who owns offsets? How many are available? How much do they cost? By adopting a banking system, the owners, quantities and even prices of available offsets can be advertised.

Purchasing offsets is also made easier with banking. Without a banking program, a new firm would need to install controls at another company or contract for such an arrangement. Compare the complexities of this type of contract with the simple purchase of an approved offset credit.

Banking offers existing companies an opportunity to create offsets in advance of their need. This could occur during retrofitting or an associated modification, when it was more economical to install additional controls. Banking also enables an existing firm to shutdown a polluting plant early, rather than keeping it operating until the emission reduction was needed as an offset. Finally, banking can make pollution control an attractive investment. Since a new polluting source must more than offset its added emissions, banking can lead to improvements in air quality in a cost-effective manner.

Process

There was a great deal of interest and support for offsets and banking in the Puget Sound region. Key government, business and public groups were involved in the regulatory development process through the existing regional air quality planning structure (5). An Advisory Council, established under State law, comprised of five industry and public representatives provided technical review of alternative provisions. A Citizens Committee, organized and staffed by the Puget Sound Leagues of Women Voters, was continuously involved as the rule was prepared. The Committee is comprised of a variety of interest groups representing business, labor, environmental, health and other organizations. Committees of the Puget Sound Council of Governments, the Metropolitan Planning Organization, reviewed drafts and gave guidance on issues. These committees consisted primarily of local elected officials. Finally, three public hearings were held by the PSAPCA Board of Directors, to gather specific comments while considering the regulation for adoption.

The following section reviews the key concerns and issues identified while the regulation was prepared.

DISCUSSION OF KEY ISSUES

A survey of the major questions and program options led to PSAPCA's publication of an Issue Paper in May, 1979 (6). Subsequently, other concerns were raised, to be answered in the form of regulatory provisions. Below are summarized a few of the major issues. Three key provisions of the offset regulation are discussed. They relate to whom the regulation applies, the quantity of offsets needed, and the methodology for calculating offsets. The central questions concerning the banking provisions are then addressed, including what type of bank to establish, what kind of reductions to allow, how to prevent hoarding and what to do if progress to attainment is not being made.

Who Needs Offsets and How Much?

The offset requirements of Section 173 of the Act apply to "new or modified major stationary sources". However, the definition of a major source or major modification has never been clearly defined, and had undergone extensive surgery by EPA, Congress and most recently by the Courts (7). Regardless of the federally required minimum, PSAPCA was led to ask: What size new source could significantly impact a nonattainment area? PSAPCA's overriding concern was to achieve healthful levels of air quality.

A strict reading of Section 173 puts the burden of offsetting growth from smaller sources on the first new "major" source entering the nonattainment area. However, PSAPCA and the reviewing committees considered more fairly distributing this responsibility. A source could emit a small quantity of emissions but cause a greater ambient impact than a large emitter. This depended on stack height, gas temperature, flow rates and other factors. It is ambient concentrations not total emissions which should govern the definition of major or significant source.

With this consideration, it was decided that the offset requirement would apply to any size source which could cause a significant ambient impact. The ambient criteria are shown in Table 1. A simplified ambient screening technique, based on EPA's Volume 10 Air Quality Guidelines (8) was adopted. This technique identifies potentially significant sources using a pocket calculator. A source that "trips" the screen needs offsets, although the source owner can always perform more sophisticated modeling if desired.

Once a significant source is identified the question is: What quantity of offsets is needed? An offset ratio is defined as the amount existing emissions must be reduced in relation to the proposed new emissions. An offset ratio greater than 1:1 is mandated by federal law. One major concern raised by the reviewing committees was that the offset ratio should be a fixed quantity. This would provide certainty to new firms and would eliminate questions of being arbitrary in setting a ratio. The major concern of PSAPCA was that a sufficient ratio be set to insure progress to attainment of the NAAQS. While anything greater than 1:1 would be acceptable, a higher ratio could provide an extra margin of safety to insure progress. A 1.3:1 ratio was eventually proposed and adopted. It was agreed to review this ratio and attainment progress within a year, to determine whether the ratio should be lowered or raised.

A variety of offset ratios have been set in other areas (9). Many areas have allowed flexible ratios determined on a case by case basis. Others, particularly in California, have established ratios which vary according to the distance between the new and offsetting sources. While this option was not specifically considered, it may not be appropriate for the Puget Sound area. First, for particulate matter, the nonattainment areas are small enough that the offsetting reductions (being 30% greater than the expected increase) should be sufficient to insure progress toward the ambient particulate standard. For ozone, which is a regional problem, emission offsets from anywhere in the large nonattainment area can be considered to reduce the total quantity of reactive hydrocarbons in the air shed. This assessment does not imply that a distance dependent or flexible offset ratio is incorrect. Rather, it shows the importance of developing an offset regulation that fits the specific circumstances and desires of each area.

Once a significant source is identified and the 1.3:1 ratio set, the quantity of offsets available from an emission reduction must be calculated. To do this one must define a baseline from which emission reductions are determined.

It was the contention of some industrial representatives that their allowable level of emissions should be used as the baseline to calculate an offset. They argued that under existing regulations, a company could emit up to a certain quantity of pollution. Should that company shut down, the emission reduction should be based on the full amount of allowed pollution. This raised the problem of "paper offsets" where a new source emitted real pollution but most of the supposed offsetting emission reduction only produced an improvement on paper.

The approach to setting a baseline suggested in EPA's Interpretative Ruling and used by other agencies, is to take an average of past actual emissions. Locally, several groups argued that if allowable emissions were not the accepted baseline, at a minimum, emission reductions should be calculated from the highest actual emission rate in the recent past. Fluctuating market conditions and unusual circumstances such as strikes make actual emissions quite variable. It could be unfair to use an averaging procedure to calculate offsets. By using the "highest actual emissions" over any consecutive twelve month period, the fullest credit could be given for real emission reductions. The final regulation allowed companies to go back to August 7, 1977 to calculate their highest actual emission rate. This was the effective date of the Act.

How Should an Offset Bank be Operated?

The central questions raised in the development of the banking system centered on the kind of bank to establish. What role should PSAPCA play in certifying credits, finding buyers and regulating sales? Should the company reducing its emissions own all the credits or should part belong to the public? Should the bank be able to lend credits as in a typical savings and loan? Should a public agency be involved in financing emission reductions? The horizon of banking options considered locally and described by others (10) seemed limitless.

The resolution of these questions was based on a philosophy of minimum PSAPCA involvement and maximum use of the private market. As an air pollution control agency, PSAPCA was not in the business of economic development. PSAPCA must have the responsibility for certifying that emission reductions are credible, but need not play banker or broker.

The selected system designated PSAPCA as a registry rather than a bank. PSAPCA would determine the validity of emission reductions, calculate credits, issue title to credits, maintain a public list of available credits and validate titles before sales. All other aspects of the system, such as finding potential credits, financing reductions, finding buyers and negotiating sales, would be left to private enterprise.

Once the type of bank was decided, the kind of emission reductions which could be used as credits had to be determined. The most obvious was installation of equipment that went beyond control levels required in the SIP. However, this raised a critical question: What was the difference between a SIP strategy and a SIP regulation?

The methodology for preparing a nonattainment SIP revision is to examine the causes of the air quality problem, analyze alternative solutions and propose a strategy which demonstrates attainment. The strategy is nothing more than words. To implement the strategy, regulations, orders or other enforceable mechanisms are needed. Often in the process of developing these enforcement tools, original concepts of the strategy are changed. The size of companies covered or the specific emission limits required by the regulation may be very different from those considered in the strategy. This meant that a reduction "required" under a SIP strategy may not be required under an adopted regulation or issued order.

It would be difficult for an industry or governmental agency to know when controls went beyond levels required in the SIP if firm rules were not in place. They could not see into the future or read the minds of the air pollution control board. Only if a regulation were "on the books" would the requirements be clear and precise. Any emission reduction going beyond this specific level should be bankable, even if previously considered part of a strategy. This position was affirmed by the PSAPCA Board in the adopted regulation.

Another type of emission reduction was shutdowns or curtailments. If these reductions could be guaranteed to be permanent, they should be bankable. A commitment would therefore be needed as a condition for issuing such a credit.

However, it became apparent as credit requests were received, that this "commitment" may not be sufficient. The owner of a shutdown gasoline terminal can commit never to reopen, but the gasoline could be transfered to a neighboring terminal. Likewise, a producer of widgets could curtail production, commit never to exceed a new limit, and receive credit for this emission reduction. But if the demand for widgets is still high, another existing widget maker might increase production, thereby increasing emissions.

An answer to this dilemma that has been suggested is a strong operating permit program. Such a program could limit gasoline throughput at all terminals and could limit widget production for each widget maker. However, it is rare for a permit program to focus on production rate. Even if production was limited, it is likely that a margin of growth would be built into the limit. Further, if the permit was violated, the company could simply ask for a higher limit. The air pollution agency could require offsets for the increased emissions from this expanded production, but this would be doubtful. First, production increases are generally not considered source modifications applicable for new source review. EPA, for instance, excludes increases in operating rate from its regulations for Prevention of Significant Deterioration (11). Second, the emission increase that triggers an offset requirement is usually rather large. This is one reason why PSAPCA considered an ambient criteria rather than tonnage.

The best solution to the shutdown problem has yet to be found by this agency. It will require further study of the types of credit requests received and evaluation of the alternative mechanisms to guarantee permanance. PSAPCA may be hampered by the fact that operating permits are not used in the State of Washington at this time.

Another question which arose was whether credit could be granted for past emission reductions. Since the SIP was prepared using a 1977 inventory, reductions after that year could be credited if not part of the requirements for showing progress to attainment of the NAAQS. It was generally felt that past actions should be bankable. However, it would be difficult to keep "going back" to review past circumstances to verify and quantify reductions. It was therefore decided to establish a 90 day period in which past emission reductions could be banked. After this period, all banking requests would have to be made prior to future actions. August 7, 1977, was selected as the beginning of this grandfather period.

An issue that surfaced later in the program's development was credit hoarding. The potential for the offset requirement to effect growth had been addressed by the Puget Sound Council of Governments (12). Their study, which focused primarily on offset demand and the ability of existing sources to reduce emissions, showed that the offset requirement itself should not limit growth. However, it would still be possible for a source or private broker to own a majority of the banked credits and hold them for speculation. This could have serious implications for future growth. Further, for a banking system to be successful, the market had to be dynamic. The more turnover in credits, the greater the incentive for creating more.

To address this problem a time limit was proposed. Other options, such as government owned credits, price ceilings and annual discounting had been discussed (13, 14). A time limit was considered the easiest to implement and could create the proper atmosphere for the banking system; that is, a banked credit was not a right to pollute, but rather a leased permit to use a past emission reduction as an offset. The proper time limit was considered to be that which forced credits onto the market in a reasonable period of time, but was not so short to discourage their creation. An owner, knowing it had a need for offsets in the future, might not shutdown a source if the credit could not be saved long enough to be used in a future expansion. Because normal business planning cycles appear to cover five to ten years, an eight year time limit for using a banked offset was selected.

Another issue raised late in the development of the rule was: what happened if progress to the NAAQS was not being made and the SIP needed to be revised? Could the bank be closed or the credits confiscated? Could a new control regulation apply to past actions? There were two concerns. One was the need to establish confidence in the bank so that companies would create credits. The other was the need to insure that banked credits did not interfere with progress toward cleaner air. The solution considered and eventually adopted was a discounting provision.

If further reductions were needed for attainment, it would be the primary responsibility of existing sources to control their emissions. Under the discounting clause, the banked credits could also share in providing the needed emission reductions. If a 20% additional reduction in emissions were needed to reach the NAAQS, the bank could be discounted by up to 20%, making a 100 ton credit worth only 80 tons. The monetary value of the credits could actually increase under this situation. Since fewer credits would be available and demand would be either unchanged or greater (demand could increase substantially if banked credits could be used by existing sources to meet new regulations under a bubble policy (15)), their value would likely rise.

Several other issues were raised during the development of the banking regulation, which time and space do not permit fair treatment. However, a key concern which should be mentioned was the legal ramification of banking. Being a new concept, banking has had no proven track record in surviving legal challenges. The basis for allowing banking is fairly well defined in the Clean Air Act and specifically addressed by EPA regulation. However, no federal legislation or regulations address specific provisions of a banking system.

Only time and the courts will provide definitive answers to these questions.

STATUS OF THE PROGRAM

The June 12th adoption of the offset and banking regulation started the 90 day period for granting credit for past emission reductions. Letters were sent by PSAPCA to over 160 local companies, industrial organizations and government agencies notifying them of the new rule and the opening of the bank. By the September 12 closing date 91 credit requests were received from 15 companies, but like a college term paper nearly all the requests came in the last two days. The reasons for the delay are varied.

Some companies expressed problems calculating their reductions. Others noted poor record keeping on past operating conditions. Some stated that corporate executives had been slow in giving local companies direction in requesting credits. PSAPCA may consider reopening the grandfather period if there is a large demand.

The companies which made the requests were primarily the major oil, paper and manufacturing firms in the area. This could have been expected since these would be the companies likely to have the technical ability, time and money to search their past operating practices to determine if credits could be requested. This points to the need for assistance to smaller firms in identifying and possibly financing emission reductions for banking.

The process for reviewing a credit request is shown in Figure 1. A copy of the credit request form is attached as Exhibit A. The credit determination is based primarily on in-house data review in contrast with an in-field evaluation.

The first step is to establish the company's highest actual emission rate before the action occurred and to confirm that the action took place. This is done by reviewing source registration and Notice of Construction files. In some cases a check is made of the enforcement files to confirm that the plant had been in compliance with applicable regulations. Source test files would also be examined in cases involving reductions in stack emission rates. In rare instances a field visit may be needed to confirm the installation of controls.

From these data bases and the information supplied by the source concerning the new operating rate, the quantity of bankable credits would be calculated. Conditions to insure permanance of the credits and compliance with the new operating rate limits would be identified. In cases of stack emission limits, a new source test might be required before granting the credits. This is the stage that PSAPCA has reached at the writing of this paper.

The next step is notifying the company of the intended quantity of credits to be granted. This allows time for questions to be raised before the credits are finalized. Subsequently, a formal banking agreement or order will be issued. This will be the legal title to the credits and the mechanisms used to enforce the necessary conditions. The agreement will be signed by both PSAPCA's Control Officer and by the owner or appropriate representative of the company receiving the credits. Once signed, the credits will be posted in a banking ledger and made public on a monthly basis through the Agency's Activity Report.

When a company desires to use a credit as an offset or sell the credit, PSAPCA must be notified with a notorized request. If the title is valid, PSAPCA will amend the existing banking order and issues a new one if necessary. The changes will be recorded in the ledger and made public.

Table 2 presents the number and type of credit requests received to this date. The shutdown of VOC sources (primarily gasoline stations) has been the most popular action. The second most frequent request has been for control of particulate emissions. This was most often baghouse installations on previously uncontrolled or poorly controlled emission points.

No credits have been approved at this time. The review has taken longer than anticipated since all requests have been examined as a group. This was done at the start of the program to insure consistency in calculations and establishing necessary conditions. Future banking requests should be reviewed in approximately one month. The first credits should be entered into the bank by the end of November.

CONCLUSIONS

There is much left to do before PSAPCA has a working offset and banking system, but the program has had a successful start. The framework built into the adopted regulation provides certainty to firms looking for creditable emission reductions. It has established fair and effective rules for new sources locating in nonattainment areas. Most importantly, it has allowed new questions to surface which never became evident in the development of issue papers or committee discussions.

By June, 1981, the entire regulation will undergo an evaluation and amendments will be considered by PSAPCA's Board. The experience gained in reviewing the initial credit requests will be invaluable in clarifying what are creditable emission reductions. Consideration will also be given on other uses for banked credits. While PSAPCA's program has only dealt with banking in conjunction with an offset program, banked credits have potential use in bubble policies, where existing companies use banked credits in lieu of installing controls to meet existing regulations; and for PSD regulations, where credits can be used in place of using part of an ambient increment allowed for growth in clean air areas. More work is needed on the marketing side of the banking program, to assist companies in finding and financing credits. Stimulation of credit use must be a high priority for the future.

EPA's forthcoming banking regulations could help to clarify the questions on creditable reductions and conditions for guaranteeing permanance and enforceability. However, it is hoped that the regulation preserves local options on the specific banking provisions. Each state or local authority should be able to investigate the needs, concerns and special circumstances of its particular area, and prepare an appropriate set of rules which will make an offset and banking program work most effectively.

NOTES

(1) Liroff, Richard A., *Trading, Selling and Banking Air Pollution Offsets*, The Conservation Foundation, March 1, 1980

(2) 41 Fed. Reg. 55524 (21 December 1976)

(3) 42 U.S.C. § § 7401-7642

(4) 44 Fed. Reg. 3274 (16 January 1979)

(5) Carson, B. and Power, M. S., "The Puget Sound Air Quality Planning Process" in *Proceedings of the Specialty Conference on Transportation and The 1977 Clean Air Act Amendments*, November 12-14, 1978, American Society of Civil Engineers.

(6) *New Source Review Regulations and Offset Policy: An Issue Paper*. Puget Sound Air Pollution Control Agency, May 1, 1979.

(7) *Alabama Power Company* v. *Costle*, 9ELR 20400 D.C. Cir., (18 June 1979).

(8) *Guidelines for Air Quality Maintenance Planning and Analysis Volume 10 Revised): Procedures for Evaluating Air Quality Impacts of New Stationary Sources*. United States Environmental Protection Agency, EPA-450/4-77-001, October, 1977.

(9) Vivian and Hall, *An Impirical Examination of U.S. Market Trading in Air Pollution Offsets*, Institute of Public Policy Study, University of Michigan, 1980

(10) ICF Inc. *Emission Reduction Banking & Trading: Concept Paper*. Produced for the U.S. Environmental Protection Agency, January, 1980.

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TABLE I - AMBIENT CRITERIA FOR OFFSET REQUIREMENTS

	Averaging Time				
Pollutant	Annual	24 Hour	8 Hour	3 Hour	1 Hour
SO_2	1.0 $\mu g/m^3$	5.0 $\mu g/m^3$	-	25 $\mu g/m^3$	-
TSP	1.0 $\mu g/m^3$	5.0 $\mu g/m^3$	-	-	-
CO	-	-	0.5 mg/m^3	-	2.0 mg/m^3

TABLE 2 - EMISSION REDUCTION CREDIT REQUESTS TO DATE *

	Pollutants			
Action ** Creating Reduction	Particulate Matter (TSP)	Volatile Organic Compounds (VOC)	Carbon Monoxide (CO)	Total
Fuel Change	3	1	0	4
Process Change	5	5	0	10
Shutdown	9	27	2	38
Curtailment	3	1	0	4
Control Equip.	19	9	0	28
Other (Nontrad.)	7	0	0	7
	46	43	2	91

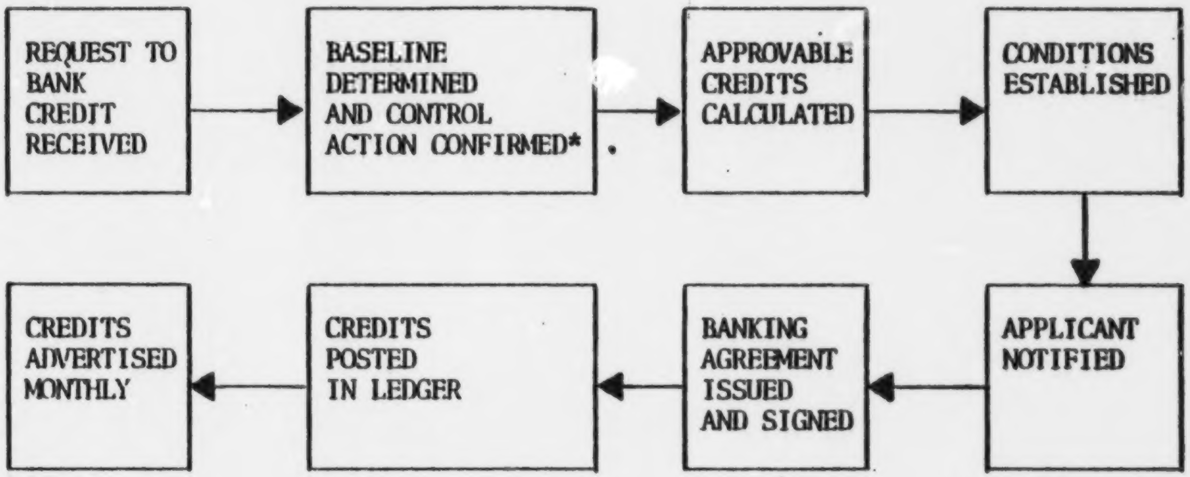
* These represent credit requests received as of November 14, 1980. It does not represent credits which have been granted.

** Where an action reduced two pollutants only the pollutant with the greater reduction is noted.

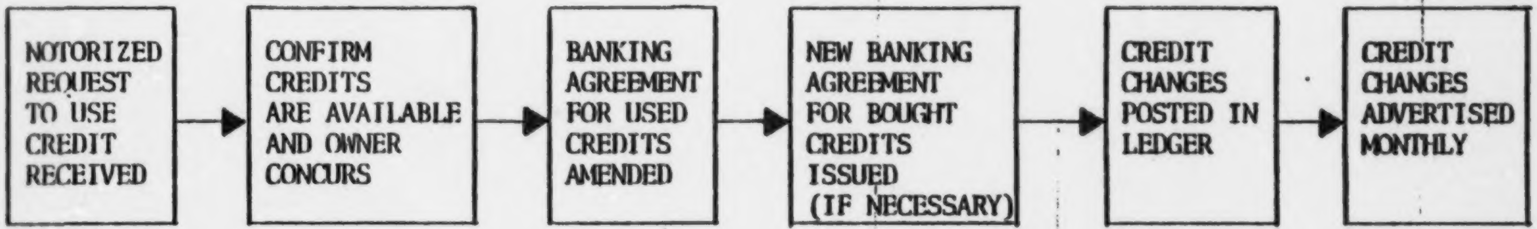
FIGURE I

BANKING PROCESS

DEPOSITS


REQUEST TO BANK CREDIT RECEIVED
BASELINE DETERMINED AND CONTROL ACTION CONFIRMED*
APPROVABLE CREDITS CALCULATED
CONDITIONS ESTABLISHED
APPLICANT NOTIFIED
BANKING AGREEMENT ISSUED AND SIGNED
CREDITS POSTED IN LEDGER
CREDITS ADVERTISED MONTHLY

WITHDRAWALS


NOTORIZED REQUEST TO USE CREDIT RECEIVED
CONFIRM CREDITS ARE AVAILABLE AND OWNER CONCURS
BANKING AGREEMENT FOR USED CREDITS AMENDED
NEW BANKING AGREEMENT FOR BOUGHT CREDITS ISSUED (IF NECESSARY)
CREDIT CHANGES POSTED IN LEDGER
CREDIT CHANGES ADVERTISED MONTHLY

* For future action a Notice of Action Completion must be received before credits will be issued.

EXHIBIT A

PUGET SOUND AIR POLLUTION CONTROL AGENCY

ENGINEERING DIVISION
410 WEST HARRISON STREET, P.O. BOX 9863, SEATTLE, WASHINGTON 98109
(206) 344 7334

Request To Bank Emission Reduction Credits

BE SURE TO COMPLETE ITEMS
6, 7, 8 & 9 ON PAGE 2

(agency use only)

DATE ______ N/C No. ______ GRID. No. ______
REG. No. ______ E.P. No. ______
SIC. No. ______ ERC. No. ______ UMT ______

1. COMPANY (OR OWNER) NAME

2. COMPANY (OR OWNER) MAILING ADDRESS

3. NATURE OF BUSINESS

4. POLLUTANT(S) FOR WHICH CREDIT IS SOUGHT (check one or more)

☐ Total Suspended Particulate
☐ Sulfur Dioxide
☐ Carbon Monoxide
☐ Volatile Organic Compounds
☐ Other: ______________

5. ACTION CREATING EMISSION REDUCTION CREDIT

(a) check one:
☐ fuel change
☐ shutdown of source
☐ process change
☐ curtailment of operations
☐ installation of control equipment

(b) describe:

(c) Was a Notice of Construction and Application for Approval submitted in regard to the above action? ☐ yes indicate: submittal date ________ Notice No. ______
☐ no

6, 7, 8, 9 OPERATING RATE DATA FOR SOURCE OF EMISSION REDUCTION - COMPLETE DATA ON PAGE 2

10. LIST ATTACHMENTS AND ACCOMPANYING DATA OR COMMENTS:

11. CERTIFICATION:

I, the undersigned, do hereby certify that the information contained in this request and any accompanying data described herein is, to the best of my knowledge, accurate and complete.

SIGNATURE DATE

12. TYPE OR PRINT NAME 13. TITLE 14. PHONE

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EXHIBIT A (PAGE 2)

PAST OPERATING RATES

. RAW MATERIALS (list starting materials) AND FUELS (list type and amount)	UNITS	MAXIMUM DESIGN CAPACITY		RATE LIMITATION UNDER ANY NOTICE OF CONSTRUCTION OR ORDER (if applicable)		HIGHEST ACTUAL RATE SINCE AUGUST 7, 1977	
		ANNUAL AMT.	HOURLY AMT.	ANNUAL AMT.	HOURLY AMT.	ANNUAL AMT.	HOURLY AMT.
a)							
b)							
c)							
d)							
e)							
f)							

7. PRODUCTS (list end products)	UNITS	ANNUAL AMT.	HOURLY AMT.	ANNUAL AMT.	HOURLY AMT.	ANNUAL AMT.	HOURLY AMT.
(a)							
(b)							
(c)							
(d)							
(e)							

PROPOSED OPERATING RATES

8. RAW MATERIALS AND FUELS	UNITS	MAXIMUM DESIGN CAPACITY		PROPOSED RATE LIMITATION (if new rate is proposed)	
		ANNUAL AMT.	HOURLY AMT.	ANNUAL AMT.	HOURLY AMT.
(a)					
(b)					
(c)					
(d)					
(e)					
(f)					

9. PRODUCTS	UNITS	ANNUAL AMT.	HOURLY AMT.	ANNUAL AMT.	HOURLY AMT.
(a)					
(b)					
(c)					
(d)					
(e)					

ACRONYMS USED IN THE PAPER

EPA	United States Environmental Protection Agency
LAER	Lowest Achievable Emission Rate
NAAQS	National Ambient Air Quality Standard
PSAPCA	Puget Sound Air Pollution Control Agency
PSD	Prevention of Significant Deterioration
RACT	Reasonably Available Control Technology
SIP	State Air Quality Implementation Plan
VOC	Volatile Organic Compounds

THE PUGET SOUND EMISSIONS BANKING EXPERIENCE

→ P 41

Brent Carson
Project Administrator
Puget Sound Air Pollution Control Agency
Seattle, Washington

On June 12, 1980, the Board of Directors of the Puget Sound Air Pollution Control Agency (PSAPCA) adopted an offset and banking regulation. It established requirements for new firms to obtain offsetting emission reductions and rules for granting emission reduction credits (ERC) to existing companies. Several unique provisions were included such as a 1.3 : 1 offset ratio, a "highest actual emissions" baseline, an eight-year time limit and a discounting provision.

The banking program is founded on free enterprise principles. PSAPCA certifies and quantifies credits, maintains a public ledger and verifies ownership prior to sale. All activities to arrange sales, negotiate price and contract for purchase are handled by the private sector.

Within a three-month "grandfather" period, fifteen companies requested credits for ninety-one actions. These requests showed interest and innovation among the area's major industries. More time is needed to determine the level of banking activity for future actions. Interest may depend on the demand for offsets from construction of new facilities or on developing other uses for ERC's.

On reviewing credit requests, some problems were identified. Among these were granting credit to non-registered sources, granting credit for non-traditional source reductions and obtaining commitments for shutdowns and curtailments. Solutions to these problems are being developed and will be used in preparing revisions to the Agency's regulation. EPA's proposed banking regulation may assist in this effort. However, federal banking rules should preserve local options for developing regulations which match the desires and characteristics of each community.

THE PUGET SOUND EMISSIONS BANKING EXPERIENCE

Introduction

The compatibility of clean air and economic growth came into question during the middle 1970's. As air quality standards continued to be exceeded in many parts of the country, demand for additional polluting industry in these same areas grew. The solution, first proposed in California, then adopted nationwide by the U. S. Environmental Protection Agency (EPA) was an emission offset policy (1). Under its offset Ruling, the EPA required new major sources locating in dirty air areas (nonattainment areas) to reduce existing pollution to more than compensate for their emission increase. The offset policy was incorporated into the 1977 Clean Air Act Amendments and made a requirement of state permit programs (2).

Under EPA's first offset Ruling, an existing source could not reduce pollution and save these reductions for a future offset. The saving of emission reductions is the essence of a banking program (3). It was not until EPA revised the Ruling (4) that the door was opened to the local development of banking programs. Whether it is the door of opportunity or the door to pandoras box remains to be seen. Emissions banking raises complex questions as would any new commodity exchange system. Additionally, it has the potential to effect public health by delaying or accelerating progress to a cleaner environment. It is the author's position that with proper constraints, banking can be used successfully for the efficient control of air pollution.

Because of the benefits of banking, the Puget Sound Air Pollution Control Agency (PSAPCA) decided to incorporate a banking provision into an offset regulation. For twelve months the Agency evaluated the critical issues concerning enforcement, equity and attainment of clean air goals (5). These issues were resolved through a local planning process which included a broad Citizens Committee, a Technical Advisory Council and affected agencies and local elected officials (6). On June 12, 1980, after three public hearings, the PSAPCA Board of Directors adopted an offset and banking regulation.

The regulation required a reevaluation of all provisions within one year after promulgation. This would allow new problems to be resolved and the experience gained by other local agencies in developing similar programs to be examined. In addition, federal banking regulations, expected in early 1981 could clarify requirements and conditions. This paper is one of the first steps in the reevaluation process. Changes in the rule are anticipated to be proposed in mid-spring.

Benefits of Banking

The greatest benefit that banking offers (8) to an emission offset program is to reduce the uncertainty for firms wishing to enter or expand within a nonattainment area. These companies need to know whether offsets are available, in what quantities and at what price. Emission offsets are another resource which must be considered by new companies as land, water and transportation access have been in the past.

An established banking program can facilitate the purchase of offsets. When the concept of offsets was first proposed with respect to the SOHIO oil terminal in Long Beach, California, the company was faced with the enormous task of not only finding firms willing to reduce pollution, but negotiating for the actual installation of controls. This was a major factor in the demise of that project (9). Had a banking program been in effect, previous emission reductions could have been created, credited and saved. The purchase of an already approved offset credit would have been a far simpler task than negotiating for the installation of control equipment on someone else's factory.

Another benefit which banking provides is the opportunity for creating offsets in advance of their need. This provides economic advantages as well as air pollution benefits. It enables a company to install a control device which produces a greater level of emission control than required by a new regulation. It also allows a firm to shut down a polluting plant early, rather than keep it running until a future expansion requires offsetting emission reductions.

Basic Features of the Regulation

The banking regulation established by PSAPCA functions essentially under private market principles. Companies which reduce emissions meeting certain criteria can be granted title to an emission reduction credit (ERC). ERC's are entered into a bank and can be saved for up to eight years. During this time the credits can be used by the owner to offset emissions from an expansion or sold to another firm in need of offsets. After the eight year period, title to the credits is transfered to PSAPCA and automatically put up for public auction. This prevents credits from being hoarded.

The function of the control agency is to certify that emission reductions are real, to quantify the amount of pollution which is creditable and to issue a banking agreement which establishes conditions to insure permanence and enforceability. The Agency must also certify at the time of a sale that the owner has valid title to the credits and is willing to sell them. All other related activities such as finding creditable reductions, financing their creation, finding buyers and sellers and negotiating sales are left to private enterprise. Figure 1 outlines the process for making deposits to and withdrawals from the bank (10).

Creditable emission reductions include installation of control devices, total or partial shutdowns, switches to cleaner fuels, process changes and control of non-traditional sources. For reductions due to control equipment, credits can be granted for going beyond an existing regulation, even if future control of that source has been suggested as an attainment strategy in an approved State Implementation Plan (SIP). For shutdowns, curtailments and fuel switches, the company must guarantee permanence. However, as discussed in a following section, many of these conditions may be insufficient.

To calculate an ERC the Agency subtracts the new emission level from an established baseline. The Agency uses as a baseline the company's "highest actual emissions" calculated from the date of passage of the 1977 Clean Air Act Amendments. This gives companies full compensation for actual emission reductions without granting credit for "paper" reductions.

To insure that progress toward attainment is made, other banking programs have applied a discount to emission reductions before entering them into the bank (11). In the Puget Sound region, it was decided to give full credit for the total quantity of the reduction, but to require a new source to obtain 30% more offsetting emission reduction than the expected increase. This 1.3 : 1 offset ratio is considered sufficient to provide Reasonable Further Progress(RFP) toward attainment, particularly when any size source (not just a "major" source) must obtain offsets if it will cause a significant ambient impact inside a nonattainment area.

In case RFP is not being made and a major SIP revision is needed, the banking regulation provides for a discounting of all banked credits up to the percent of reduction needed to demonstrate attainment. This provision guarantees that the banked credits cannot prevent clean air goals from being met, but provides assurance to credit owners that their ERC's will not be totally confiscated, nor will new regulations apply to past actions.

Another feature of the banking regulation allows credits to be granted for emission reductions back to August 7, 1977. However, rather than approve past reductions at any time in the future, it was decided to establish an initial ninety day period in which all past reductions must be applied for. This serves three purposes. First, it eliminates the need to research past conditions at any point in the future. Second, it allows the Agency to gain experience by reviewing a variety of credit requests at once. Third, it establishes an immediate pool of offsets available for purchase. This gives the bank credibility and encourages the creation of further ERC's.

Current Status

Since the emission bank opened on June 12, 1980 ninety-one requests for ERC's have been received. These have been reviewed, but as of December 31, no credits have been formally approved. One reason for this delay has been the time required to establish adaquate and consistent conditions on all credits to insure permanence and enforceability.

Table I lists the number of credit requests received by type of action and pollutant. The majority were for source shutdowns, primarily service stations. These shutdowns were not related to air pollution requirements, but due to economic factors. In reviewing shutdowns, the Agency calculated what emissions would have been if Reasonably Available Control Technology (RACT) had been installed, and gave credit only from that baseline.

The second most frequent action was the installation of control equipment. However, many of these requests were for controls required to meet RACT. It seems that companies tried to get as much credit as possible, even if they were likely to be disapproved.

Some interesting and innovative control actions were claimed for credit. As one example, a firm requested credit for installing hooding connected to a baghouse on a previously uncontrolled source of particulate matter. This seemed approvable at first. However, it was discovered that this source had previously emitted particulate inside the building only. The equipment, designed to control a workplace pollution problem, would actually increase ambient pollution!

Several requests were for very small emission reductions, such as removing welding guns from service. Often, these emissions had not been included in an industry's emission inventory. As a matter of policy, the Agency will likely disapprove any ERC calculated below one ton per year. Many ERC claims were received for reductions occuring outside a nonattainment area for that pollutant. Because the current banking program is limited to use in offsetting new source emissions inside nonattainment areas, these requests are likely to be denied as well.

The most difficult requests to review related to the control of non-traditional sources. One unusual request was from a source asking for ERC's due to the construction of a building on a previously undeveloped parcel of land. The company claimed that the new building prevented cars from parking on the previously dusty lot and eliminated wind blown dust from the now covered area. It is likely that this type of request will be denied due to a lack of data proving a net emission reduction. The new building might contain equipment which now emits additional pollution and the building may have attracted more cars to the facility.

In contrast to a number of requests which were often amusing, but probably not approvable, many actions will likely be accepted. Several of the source shutdowns may be granted credits, calculated at a RACT level of emissons. Most of these involve reductions in Volatile Organic Compounds (VOC). For a few companies, energy conservation actions have resulted in real savings in fuel consumption. With commitments on new limitations of fuel use, these firms will likely recieve ERC's. Some credits may also be granted for baghouse installations on previously uncontrolled particulate emissions and vapor recovery systems on gasoline terminals exempt from VOC regulations.

Preliminary determinations have been made on most credit requests. Approximately forty-eight actions are likely to be approved. The number, location and quantity of these ERC's are shown in Table II. These are only preliminary estimates and may be substantially revised after final review and formal action.

The Problems of Banking and Possible Solutions

Some of the problems encountered in implementing PSAPCA's regulation are discussed below along with some of the possible solutions. Where appropriate, concepts being considered by EPA for inclusion in their forthcoming banking regulation (12) are mentioned as they related to these issues. Comments are also provided on the potential effects which EPA's banking regulation may have on local banking programs.

Shutdowns vs. Transfers

The first problem which arose in reviewing ERC requests was in guaranteeing the permanence of emission reductions from source shutdowns. In one example, an oil tank farm was no longer to be used for gasoline storage. Removing the tanks from gasoline service created a real reduction in VOC emissions at the site. The permanence of the shutdown could be enforced by a signed commitment. The problem remained of preventing the gasoline from being transfered to another terminal in the nonattainment area. If a new terminal had to be build, it might require offsets. However, it would be possible to increase the throughput of gasoline at another tank farm without exceeding the allowed capacity. VOC's might be reduced at one site, but not changed regionally.

This problem is not limited to gasoline. When throughput or any operating parameter is not specifically limited to a rate at or near the actual emission rate, there is a potential for granting credits for reductions at one location which could be lost through increases elsewhere.

One idea which has been suggested by EPA is to establish an areawide emission limit on all similar sources. If an enforcement mechanism were available and accurate data could be collected, this might be a workable solution. However, it is unclear who would be required to obtain offsets if the limit was exceeded. Would all sources be penalized for one company's increase? What if three companies expand throughput and the limit is broken, but individually no single company would cause the limit to be exceeded?

Another mechanism which has been mentioned is the creation of a new organization would would buy replacement ERC's if an emission reduction proved to be impermanent. While a solution such as this is possible, its complexity would make it difficult, if not impossible, to implement.

For certain types of source categories, prohibiting creation of ERC's may be an alternate approach. This could apply to minor sources which do not require approval to build or expand, but could reduce pollution as an offset. This does not address the issue of major source reductions. Here, the only viable solution may be the issuance of operating permits which establish permitted emission rates close to actual levels, and require offsets for increases in emissions above this limit.

Non-point Sources

One type of reduction which was not clearly identified was the control of non-traditional sources, such as unpaved roads or lots. Some of the unusual non-traditional source control credit requests attest to the fact that quantification of these types of actions is extremely difficult. At a minimum, a consistent formula is needed for such calculations.

Transportation sources are not specifically covered in the Agency's regulation. This was done for several reasons. First, enforcement of a transportation related emission reduction is nearly impossible. How can a control agency determine if a new eleven member vanpool is made up of previous single occupancy auto drivers or bus riders? What action could be taken if six members drop out? Second, under the Clean Air Act, all reasonably available transportation control measures are to be implemented. It would be impossible to approve a transportation control for banking if an adopted SIP already committed to implement the measure in general terms (e.g. "expand vanpool services" or "improve transit services").

Non-registered Sources

Can ERC's be approved if the reduction was from a source not previously registered? In the Puget Sound region, the only situations which arose were very small source reductions which had not been included in the emission inventory. However, if a previously unknown major source had requested credit, the Agency could have applied existing regulations to the new source, granted the remaining emissions as a credit then added these to the RFP line. In most cases these emissions will not significantly change the attainment date. The EPA has suggested that such sources only be given credit for their reduction which goes beyond the control percentage required of all sources in the nonattainment area.

Regulations vs. Strategies

One decision made by PSAPCA's Board was to grant credits if a reduction was not required by an applicable regulation, order or other enforceable agreement. This differs from the position suggested by EPA, that any emission reduction assumed in the SIP is not bankable. In theory, EPA's position may be well founded, but in practice it is impractical and grossly unfair.

A SIP contains both strategies and enforceable instruments to implement the strategies. An approved SIP will often include a strategy wich assumes certain regulations will be developed and adopted in the future and estimates their effectiveness. Take, for example, a commitment to implement a future VOC regulation. Perhaps a source category has been identified, but no emission limits, cutoff points or exemptions have been set. Should a VOC source in that category be prevented from receiving credit for taking some control action today which may be required in the future? The final regulation might exempt that source or be less forceful than considered previously. It would be difficult for a control agency to know when an action went beyond a regulation if no regulation was "on the books".

Some areas have suggested postponing the allowance of banking for certain source categories when a regulation is under development but not yet promulgated. This could prevent a source (which knows that specific requirements may be adopted in a matter of weeks) from submitting a banking request just "under the wire". However, the mechanism should not be used when the specific regulations are unknown.

Criteria for Using ERC's

PSAPCA's regulation allows ERC's to be used as offsets if the new source obtains 1.3 times more reductions than their new allowed emission rate. No check of ambient equivalence between new and reduced emissions is required. No mention of ambient equivalence is mentioned in Section 173 of the Clean Air Act, only a net emission decrease. A 30% extra emission reduction can insure RFP, especially if the offset requirement applies to minor sources as well as major. When using banked emission credits for purposes other than new source offsets, such as for bubbling (13) or for Prevention of Significant Deterioration (14), ambient equivalence might be appropriate.

Time Limits and the Public Auction

As discussed earlier, PSAPCA grants ERC's for an eight year period. If not used in eight years, title is transfered to the Agency and the credits are put up for public auction. Proceeds from their sale will go to the previous title holder.

Several issues must still be resolved concerning the auction system. One is that credits purchased at the auction must be used immediately. Without such a limitation, credits could continue to be held, defeating the purpose of the time limit; to prevent hoarding. Some reasonable period, such as three months, might be appropriate for the new owner to submit a Notice of Construction committing to the use of the ERC's. Another limitation is needed to prevent a firm from participating in the auction of their previously owned credits. Since that company would obtain proceeds from the sale, they could outbid everyone else. Finally, if credits are not purchased at the first auction a cycle of auctions might be held. The previous owner might be granted priority use in between these auctions, as a means of providing some continuing equity for that company.

Enforceable Conditions

Specific conditions in a banking agreement are being addressed by PSAPCA. All credit requests are being considered together to determine what conditions have general applicability, which are specific for certain pollutants or types of actions and which are needed for individual ERC's. The goal is to create a standard form on which applicable conditions would be checked off. This would save time and would insure fair and consistent treatment on all credit requests.

Some of the conditions being considered include: hours of operation, operation and maintenance of control equipment, fuel use, production rate or throughput limitations and testing and reporting requirements. A general condition being considered would put a freeze on the use or sale of credits, should the source violate any of the conditions. This could be expanded to include the source's overall compliance with other applicable air pollution regulations. If a credit has already been sold, the firm creating the ERC must still he held liable for maintaining the conditions creating the credit. A firm purchasing an ERC must be excluded from enforcement action related to conditions on the created credit, since that firm has no control over the company which created the emission reduction.

Marketing

One area which has not developed fully in the Puget Sound region is the private market aspects of banking. There is, or example, a critical need for technical assistance in the creation of ERC's. The industries which applied for ERC's during the grandfather period were larger companies. It seems that small firms may have lacked the time, staff or resources to look for possible reductions available for credit. This is likely to continue in the future unless assistance is provided.

On the purchasing side, there is a need for brokers, to find both sellers and buyers, to negotiate prices and to draw up contracts. The financial sector may wish to consider the potential risks and benefits before investments are made in either the creation of credits or their purchase.

Many questions have been asked regarding the price of ERC's. Since no sales have taken place, prices have not yet been established. The market will set the price. Factors affecting the price will be the total quantity of credits in the bank, the willingness of owners to sell, the age of the credits (credits closer to eight years old will sell at a lower price if all other factors are equal) and the demand for credits. Demand will be influenced by how well progress is being made to clean up the air and by discovery of other uses for ERC's.

How will a buyer know a good price when he sees one? The first step may be in comparing other similar transactions and their prices. In San Fransisco, an external offset occured where VOC emission reductions sold for $350 per ton (15). While not a true banking transaction, this did establish a starting point in defining the value of an ERC. The complex nature of ERC pricing may require the assistance of an ERC assessor, functioning like a real estate assessor. This individual could use a standard system for evaluating the price of offsets, and could determine the "fair market value" for a particular emission reduction.

An ERC assessor might be particularly useful in the State of Washington where the Constitution prohibits the lending of the public credit (16). As an example, this prohibits a city from giving public property to a private firm to encourage certain development. The city can sell the property, but only at its "fair market value". If a city creates its own emission reductions, it could be limited to using them to offset emissions from new city owned sources. However, if a "fair market value" could be determined, the credits could be sold to a private firm. This situation is very different from other states where offsets can be given away by the public sector. The best example may be in Pennsylvania, where the Commonwealth created emission reductions by changing asphalt paving practices and gave the offset to Volkswagen which was building a new assembly plant.

Summary

The benefits which banking offered an offset program provided the incentive for the local development of the banking regulation. To date, the program has been successful in generating interest in the creation of emission reductions and will soon be capable of providing offsets for new sources constructing in nonattainment areas.

Banking is a complex system. As the regulation developed and as implementation proceeded, more and more difficult issues surfaced. Banking contains hidden problems, many of which do not become evident until the requests for credit are received or conditions are being written. This paper has discussed most of these critical concerns and has suggested possible solutions.

EPA's developing banking regulation could also assist in defining those requirements which a banking regulation should include. Past EPA publications on banking and trading have been very valuable to PSAPCA's program, as has been the direct assistance of members of EPA's banking and trading team. It is hoped that in its final form, EPA's banking regulation will be flexible, to allow states and local agencies to develop regulations which meet their specific needs and desires.

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3. ICF Inc. *Emission Reduction Banking & Trading: Concept Paper*, produced for the U. S. Environmental Protection Agency, Washington, D.C., January 1980.

4. 44 FR 3274, January 16, 1979.

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6. B. Carson and M.S. Powers, "The Puget Sound air quality planning process," in *Proceedings of the Specialty Conference on Transportation and the 1977 Clean Air Act Amendments*, November 12-14, 1979, American Society of Civil Engineers, New York, 1980, pp 382-395.

7. Regulation I of the Puget Sound Air Pollution Control Agency, originally adopted March 13, 1968 as amended June 12, 1980.

8. J.S. Hoffman, "Economic advantages of emission reduction banking systems," presented at the 72nd Annual Meeting of the Air Pollution Control Association Cincinnati, OH, June 1979.

9. R.S. Liroff, *Trading, Selling and Banking Air Pollution Offsets*, The Conservation Foundation, Washington, D.C. 1980.

10. B. Carson, "An emission offset and banking regulation for the Puget Sound region," presented at the Annual Meeting of the Pacific Northwest International Section of the Air Pollution Control Association, Yakima, WA, November 19-21, 1980.

11. T. Westerlin and M. DeBusschere, "Emissions banking in Louisville, Kentucky," presented at the National Conference on Offsets/Pollution Control Financing, Council of Pollution Control Financing Agencies, Houston, TX, March 12-14, 1980.

12. Proposed rulemaking on trade-offs, banking and bubble rules as SIP revisions, preliminary working draft, (scheduled to be released by U. S. Environmental Protection Agency in early 1981).

13. 44 FR 239, December 11, 1979.

14. 45 FR 52676, August 7, 1980.

15. J. Gabe, "Squatter's rights," CBE Environmental Review, September, 1980, p. 3.

16. Consitution of the State of Washington, Article 6, Section 7.

TABLE I. EMISSION REDUCTION CREDIT REQUESTS TO DATE * (10)

	Pollutants			
Action** Creating Reduction	Particulate Matter (TSP)	Volatile Organic Compounds (VOC)	Carbon Monoxide (CO)	Total
Fuel Change	3	1	0	4
Process change	5	5	0	10
Shutdown	9	27	2	38
Curtailment	3	1	0	4
Control Equip.	19	9	0	28
Other (Nontrad.)	7	0	0	7
	46	43	2	91

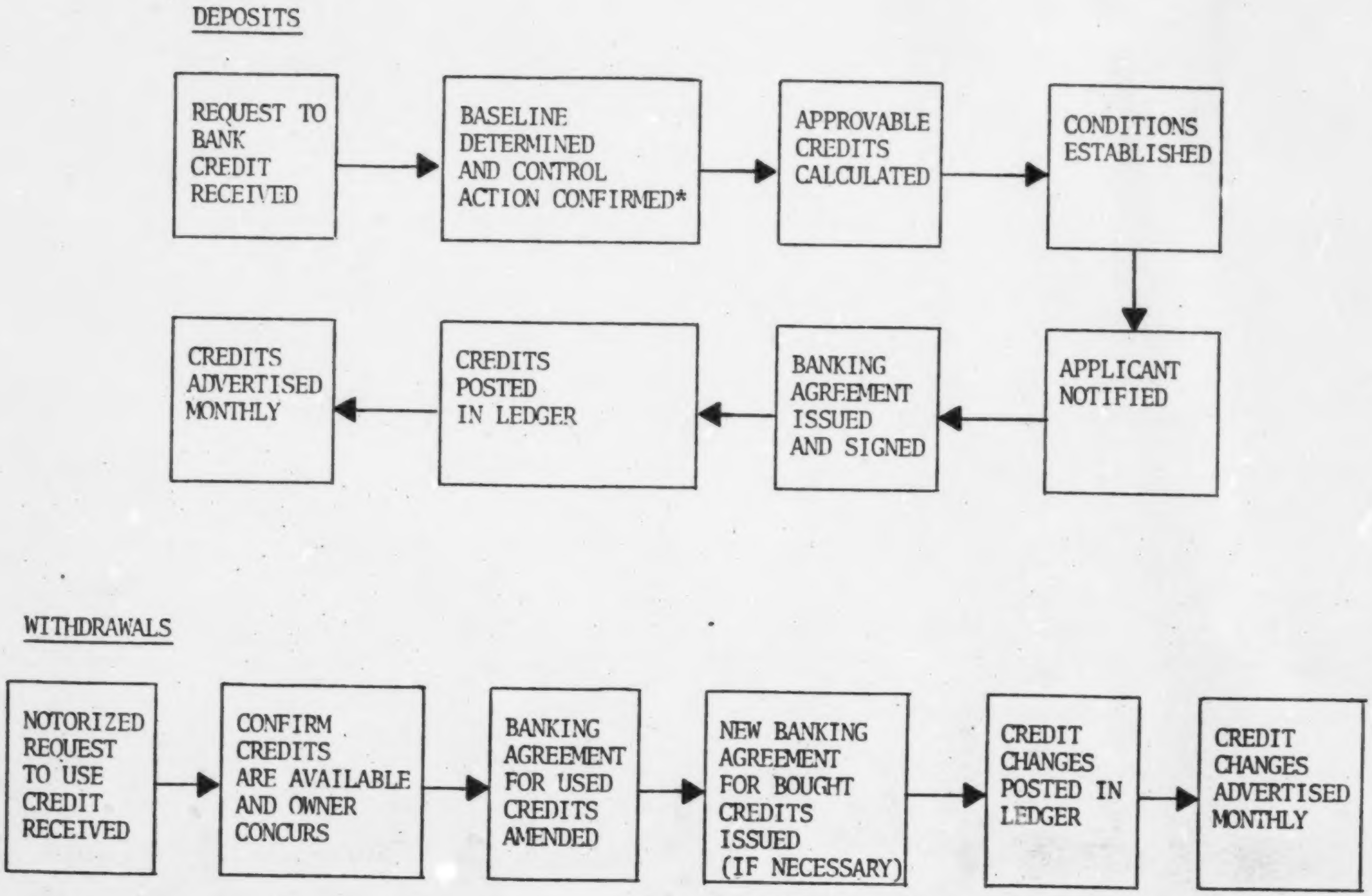
* These represent credit requests received as of November 14, 1980. It does not represent credits which have been granted.

** Where an action reduced two pollutants only the pollutant with the greater reduction is noted.

TABLE II. PRELIMINARY DECISIONS ON EMISSION REDUCTION CREDIT REQUESTS

Pollutant	Nonattainment Area	Number Received	Preliminary Action Approved	Denied	Pending	Estimated Tons Approved
TSP	Seattle	9	7	2	0	29
	Tacoma	7	5	1	1	204
	Kent	2	0	1	1	0
	Renton	4	0	0	4	0
	Outside	23	0	23	0	0
VOC	Regional	45	30	10	5	172
	Outside	2	0	2	0	0
CO	Regional	7	6	0	1	1558

Figure 1. The emission banking process (10)


DEPOSITS
REQUEST TO BANK CREDIT RECEIVED
BASELINE DETERMINED AND CONTROL ACTION CONFIRMED*
APPROVABLE CREDITS CALCULATED
CONDITIONS ESTABLISHED
APPLICANT NOTIFIED
BANKING AGREEMENT ISSUED AND SIGNED
CREDITS POSTED IN LEDGER
CREDITS ADVERTISED MONTHLY
WITHDRAWALS
NOTORIZED REQUEST TO USE CREDIT RECEIVED
CONFIRM CREDITS ARE AVAILABLE AND OWNER CONCURS
BANKING AGREEMENT FOR USED CREDITS AMENDED
NEW BANKING AGREEMENT FOR BOUGHT CREDITS ISSUED (IF NECESSARY)
CREDIT CHANGES POSTED IN LEDGER
CREDIT CHANGES ADVERTISED MONTHLY

* For future action a Notice of Action Completion must be received before credits will be issued.

40<

EMISSION REDUCTIONS FROM SHUTDOWNS:
Their Role in Banking and Trading Systems

P63

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August, 1980

Abstract

As banking and trading systems develop, the question of how to treat emission reductions from source shutdowns continually arises. This question touches on a variety of economic, legal and environmental issues. In addressing these issues, this paper shows why the overall question of shutdowns is important, examines the recent history and current regulatory environment surrounding the question, and makes specific policy recommendations.

The history of offset transactions indicates that shutdowns have been a significant source of emission reductions, particularly as needed for replacement construction. A survey of state practices indicates that, by and large, control strategies do not preclude the qualification and use of emission reductions from shutdowns.

A number of possible rules for qualification and use are presented, with the final recommendation that all shutdowns be credited, and subsequently discounted year by year, if not used. Recommended guidelines in establishing rules include uniform treatment of shutdowns and curtailments, private retention of emission reductions from shutdowns, and encouragement of replacement and modernization.

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Shutdowns are a frequent phenomenon taking place from time to time in virtually all industries and areas, and under a variety of circumstances. They can be induced by obsolescence or wearing out of equipment, by contractions in demand for particular goods and services, by movement of plants among regions, or by the replacement of domestic production by more competitive imported goods. Although some of these developments have undesired effects on the nation's economy and the economy of affected areas, there exists a potential for some compensating relief. Banking and trading systems provide a means for achieving this benefit.

A banking and trading system provides an institutional framework through which a firm can receive credit for reducing its emissions beyond the level required by the applicable State Implementation Plan (SIP). The resulting Emission Reduction Credit (ERC) can be banked for future use in an offset or bubble application, or can be sold to another firm.

A shutdown results, at least initially, in a 100 percent reduction in emissions from a particular source. To the extent that the reduction is permanent, there is scope for the creation of ERCs from shutdowns. Where the prospects for creation of emission reductions through other avenues, specifically through more intensive use of control technology, are limited, shutdowns can provide a ready and relatively inexpensive source of ERCs for use in offset and bubble applications.

Although shutdowns offer a potential low-cost source of ERCs, careful precautions must be taken to ensure that their use in a banking and trading program does not violate Clean Air Act requirements.

This paper examines a number of important issues affecting the role of ERCs from shutdowns as part of a banking and trading program. It includes the following:

- A discussion of the potential role of shutdowns in developing banking and trading systems.
- A summary of recent experience in using emission reductions from shutdowns as offsets and in bubble applications.
- A discussion of several key issues affecting the creation and use of ERCs from shutdowns.
- A description of some alternate approaches to addressing several of these issues.

THE ROLE OF SHUTDOWNS IN DEVELOPING BANKING AND TRADING SYSTEMS

This section will discuss the potential represented by shutdowns in the development and use of ERC banking and trading systems. It will highlight the importance of shutdowns as a rich source of ERCs, a valuable economic development resource. It will then show how shutdowns, through banking and trading, can spur future technological innovation in pollution control.

Shutdowns Are A Likely Source of Emission Reduction Credits

Nonattainment areas, especially those characterized by an older industrial base, face a severe problem in accommodating economic development while making continued progress toward the goals of the Clean Air Act. To allow for growth, state and local air pollution control agencies can impose further controls on existing sources of pollution, or they can extend controls to sources not otherwise targeted in the RFP strategy.

In most major urban centers, either of these strategies faces limited prospects for success. As many of these areas are experiencing difficulty in approaching attainment, they have already imposed stringent controls on existing point sources. At these levels of control, any further increment will be very expensive, if not infeasible. At the same time, attempts to extend controls to "nonconventional" or minor point sources will require identification and quantification of these sources, placing an enormous burden on administrative resources. Since these sources are typically not subject to permit requirements, enforcement of the emission reductions would be extremely difficult and burdensome, if at all possible.

In these areas it is, for the same reasons, difficult for individual sources to seek out and arrange emission reductions to allow for their own construction or expansion under the Offset Policy.

Shutdowns represent an inexpensive and readily available supply of emission reductions for use as offsets or in bubble applications. Where older facilities are replaced or rebuilt, and the new equipment can make more effective use of existing control technology, the net reduction in emissions can be substantial. The rate of this capital replacement process has been high in recent years. 1/ Where shutdowns take place without replacement, the resultant emission reductions can, under the proper conditions, likewise serve as a ready source of ERCs.

ERCs from Shutdowns Can Be Used in Development Planning

One objective of communities in creating a banking and trading system is to ensure that ERCs are available for use in economic development strategies. Where available offsets for new construction permits are a limiting factor in a community's development prospects, ERCs can play a pivotal role. Community planners can assist prospective developers in obtaining the necessary package of offsets required, looking to the stock of banked ERCs as a source for these offsets. Several communities have turned to shutdowns as a ready source of ERCs to serve this purpose.

Communities can adopt, and in some cases have adopted, the practice of outright confiscation of the ERCs generated by shutdowns. As an alternative to this, communities could "tax" a portion of the ERCs for public ownership. A policy of confiscation or taxation at a high rate is inadvisable. Besides raising the troublesome issue of legal entitlement, it would likely result in fewer shutdowns taking place, thus defeating its purpose. A later section of this report will discuss these considerations in greater detail.

1/ The annual rate of capital turnover in the manufacturing sector has been estimated at five percent. This figure is based on depreciated dollar value; in terms of productive capacity, the figure would be substantially higher. See "Fixed Nonresidential Business and Residential Capital in the United States, 1925-1975," U.S. Dept. of Commerce, Bureau of Economic Analysis, 1976 (NTIS Publication PB-253725).

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Because shutdowns will provide a ready supply of ERCs, there should be no need for communities to take direct control of the credits. In particular instances the public sector might wish to provide financial and other assistance to firms requiring ERCs for expansion, but the banked credits should remain in the hands of the private sector. The existence of such a supply of emission reductions will serve to allow (and attract) new growth, regardless of who owns the credits.

ERCs From Shutdowns Can Induce Innovation in Control Technology

As the supply of ERCs from shutdowns builds, more and more offset transactions, between firms, will take place. As more of these transactions involve the actual purchase and sale of ERCs, it will become clear that emission reductions, per se, are a potential source of revenue, stemming from a sustained demand for ERCs. A banking and trading system will provide a means of realizing the value of emission reductions. Accordingly, firms in a position to create emission reductions through the application of new technology will have a greater incentive to do so.

In this fashion, banking and trading will provide a market in which pollution control is a profit-generating activity. The supply of ERCs from shutdowns will serve to "prime" this market.

PAST EXPERIENCE - HAVE WE EFFECTIVELY USED ERCs FROM SHUTDOWNS?

A recent nationwide compilation of planned or completed emission offset transactions provides some illumination as to the effectiveness of recent use of ERCs from shutdowns. 2/

2/ Wes Vivian and William Hall, "An Empirical Examination of U.S. Market Trading in Air Pollution Offsets" (Draft report), University of Michigan, Institute of Public Policy Studies, September, 1979.

Some 47 of the roughly 250 fully documented cases were clearly identifiable as involving offsets generated by source shutdowns. These cases break down as follows:

- Eleven were "external" offset transactions, in which the firm creating the emission reduction by shutting down was not the user of the offset credit. In five of these cases, the credit was donated to the users. In two cases, the government agency assigned the credit. The remaining four cases involved the sale of the credits, two as part of an outright sale of the whole facility.
- Industrial and powerplant boilers were the predominant type of facility involved in the shutdown cases.
- Industries using ERCs from shutdowns included steel, printing, automobile manufacturing, paper and packaging, and petroleum.
- Twenty-two cases involved hydrocarbons, nineteen involved particulates, twelve involved sulfur oxides, and one involved nitrogen oxides.
- Most of the ERCs from shutdowns were used for replacement and reconstruction. Of the 36 internal cases, 27 involved replacement of some or all of the retired facilities.

Shutdowns are also a likely source of emission reductions for use in bubble applications. At least four of the bubble notifications proposed to date have incorporated shutdowns as the source of the emission reductions.

In summary, the documented cases of ERC generation and use from source shutdowns indicate that replacement and reconstruction are likely to continue as a major use of emission reductions from shutdowns. Shutdowns are a rich supply of ERCs; with the installation of banking and trading as a means of channeling this resource to its most effective use, the prospects for new growth and more cost effective pollution control are greatly enhanced. Several issues, however, must be resolved in order to bring this about.

ISSUES IN CREATING AND USING ERCs FROM SHUTDOWNS

The creation and use of emission reduction credits from shutdowns immediately raises a number of troublesome policy issues. These arise primarily in reconciling the objective of maximizing the supply and use of ERCs with the need to balance any effects that might conflict with the goals and requirements of the Clean Air Act.

Who Owns the ERCs from Shutdowns? - The Question of Entitlement

As indicated earlier, this issue has already given rise to some controversy, and promises to develop into a major point of contention in the future.

Two of the above offset cases raise the troublesome issue of ownership of the ERCs from shutdowns. In both of these, the offset credit was assigned to users by the state or local air quality management authority. In one case, a company had moved its entire operation to another state; the authority asserted that wholesale abandonment of a facility constitutes forfeiture of any potential ERCs from the shutdown. In the other case, a firm had terminated a lease to another company, forcing it to shut down. The authority assigned the credit to the owner, despite the leaseholder's asserted claim to the resultant ERCs. These cases show that the questions of ownership, as it affects the varius parties at interest, deserves careful consideration.

Economic Development Objectives

Emission reduction credits are potentially a vital factor in the growth prospects of many communities. Development plans are increasingly incorporating comprehensive packages designed to attract new industrial projects. These packages include, among other things, tax incentives, siting assistance (assembling parcels of appropriately zoned land, establishing industrial parks), and providing ancillary services, such as water hookups and roads. In nonattainment areas, these packages could also include the availability of ERCs for use as offsets.

In regions that are facing a decline in the industrial base, the desire to attract new investment is especially keen. These areas are also most likely to have a supply of potential ERCs from permanent shutdowns. The temptation is strong for these communities to assume ownership and control of the ERCs for subsequent donation to new development projects.

Legal Uncertainty

Firms that shut down or curtail operation of individual sources can make (and have made) the persuasive argument that they are the rightful owners of any ERCs that are credited to shutdowns. This will be especially likely when a firm remains in the area, shutting down one or more, but not all, of its sources. The firm would likely wish to bank its ERCs to accommodate its own future expansion plans, to bubble, or to sell as a means of raising capital.

Public Ownership of ERCs Could Adversely Influence Business Decisions

A policy of government appropriation of ERCs from shutdowns can have undesired effects on the behavior of source owners, and could present difficulties in administration.

Incentive to Shut Down

On the margin, the opportunity to sell or bank ERCs could be a pivotal factor in the question of whether to retire a facility or installation. The value of the ERCs is the determinant of the "width" of this margin. Private retention of the ERCs could provide an inducement to shut down operations at a source, especially if the facility is old, relatively inefficient in production, and relatively expensive in meeting pollution control requirements. Denial of ownership of ERCs might result in "dirty" marginal facilities staying in operation, giving their owners control over any potential ERCs.

With ERCs in hand to satisfy emission offset requirements, future expansion and consolidation would be facilitated. Of particular importance is the need to allow companies to rebuild or replace older facilties. Private retention of ERCs from shutdowns will, beyond providing a means to do this, provide an incentive to modernize, especially if the replacement process produces excess reductions that can be banked or sold.

Cutback Distinction

Any distinction between shutdowns and curtailments in granting credit for emission reductions would be illogical. A 99-

percent reduction in operations will have essentially the same economic and emission reduction effects as a total shutdown. Any policy that treats shutdowns and curtailments differently, with respect to creation and/or ownership of ERCs, could have undesired effects. A policy allowing ERCs to be created and retained for curtailments but not for shutdowns will induce companies to cut back gradually, acquiring ERCs in the process, until operations are at a fraction of their full-capacity level. When the facility finally ceases all operations, it will already have received credit for emission reductions from previous curtailments.

At the same time, if companies can receive credit for curtailments, then this will encourage them to initiate a permit revision limiting hours of operation, as a condition of the credit, thus making the reduction permanent and legally enforceable. If companies cannot claim credit for curtailments, there will be no such inducement.

To summarize, any rule that denies or restricts private ownership of ERCs from shutdowns and cutbacks will likely diminish the overall supply of these ERCs. Any rule that treats shutdowns and cutbacks differently is illogical and unenforceable and will likely precipitate business decisions that will likewise restrict the supply of ERCs, or delay the retirement of marginal and often dirty facilities.

Ensuring that Emission Reductions are Real, Permanent, and Enforceable

A policy of crediting emission reductions from all source shutdowns will, in a number of instances, be ill advised. To satisfy the requirements of the Clean Air Act only emission reductions that are "genuine" can be credited and used under the offset and bubble policies. Allowing emission reduction credits from shutdowns will thus pose a problem in two major areas:

- o The State Implementation Plan (SIP) might previously anticipate shutdowns, in which case the emission reductions are already "captured" and counted as a component of the state's demonstration of attainment.
- o A shutdown could result directly in increased operations at another source, or in construction of a new facility. If the accompanying increases in emissions are not subject to offset requirements, crediting ERCs for the shutdown could result in an overall net increase in emissions.

Shutdowns As Part of SIP Strategy

A state's attainment strategy might incorporate shutdowns, as part of the SIP design, in the following ways:

- o Known cases - In some cases SIP designers are aware of specific instances in which firms have recently shut down sources or are planning to do so in the near future. Here, the shutdowns are enumerated explicitly in the SIP, as part of its reasonable further progress (RFP) demonstration.
- o Projected decline - In some states the SIP design predicts a certain number of shutdowns as part of a negative growth projection for certain industries in the area. Here, emission reductions from these shutdowns are implicitly identified as part of the strategy.

- Turnover - SIP designers can also predict that, as facilities wear out, replacement construction will employ more modern control technology. This would apply particularly to major sources facing the requirement to employ LAER. The emission reduction margin generated by this replacement would thus appear as a stated component of the attainment strategy. Similarly, a projected change in the industrial mix of an area (e.g., a shift toward more service-oriented industries) has been proposed as the basis for SIP design.

In these instances, it would be wholly inappropriate to credit the individual source owners with ERCs from shutdowns. To do so would be to double count the reductions; subsequent use of the ERCs would bring total emissions above the RFP demonstration level.

Shutdowns Leading to Increased Emissions from Other Sources

The problem of reductions from specific shutdowns being incorporated in SIP strategy, as described above, is relatively easy to identify. Where this is the case, the appropriate policy clearly is to exclude the anticipated shutdowns from eligibility for ERC certification. The most serious threat of certifying ERCs lies in the area of displaced demand — where new or existing facilities increase production (and emissions) to meet the demand generated by the shutdown of a similar facility. This issue is also perhaps the most elusive among all considerations related to source shutdowns.

Simply stated, the threat lies in the possibility that a shutdown may take place for reasons other than a contraction in demand for the good or service produced by the source in question. If this is the case, then the shutdown could directly induce an expansion of operations, by the same firm or by another firm, at the same site or elsewhere. If this expansion takes place in the same nonattainment area, then the shutdown will represent a "paper" reduction, constituting little or no real reduction in net emissions. If, in addition, the expansion is not subject to offset requirements, then allowing ERCs for the shutdown will result in a net increase in emissions, a clear threat to achieving the goals of the Clean Air Act.

Contributing to this problem is the fact that operating permits frequently do not limit total emissions. The limitations apply to emission rates, specifying a maximum level of emissions per unit of production, or per unit of resource input (e.g., maximum emissions per million BTU heat input). To the extent that permits do not limit operating hours or production rates, their ability to restrict total emissions is limited. Because many sources operate below rated capacity, if demand for their product increases they can step up operations and therefore increase total emissions without requiring a permit modification.

In formulating a policy to address this problem, the key questions are, "Under what circumstances is the threat of 'paper' ERCs the greatest? What specific provisions can be brought to bear so as to preclude or counteract this threat?" At the same time, these provisions must respect the need to formulate a coherent and predictable policy, one in which the parties at interest know where they stand prior to initiating actions. If determinations are required of state and local authorities, then the success of the system could suffer through the imposition of undue burden on administrative resources, and through uncertainty and delay as many of the determinations are likely to face administrative and legal challenges.

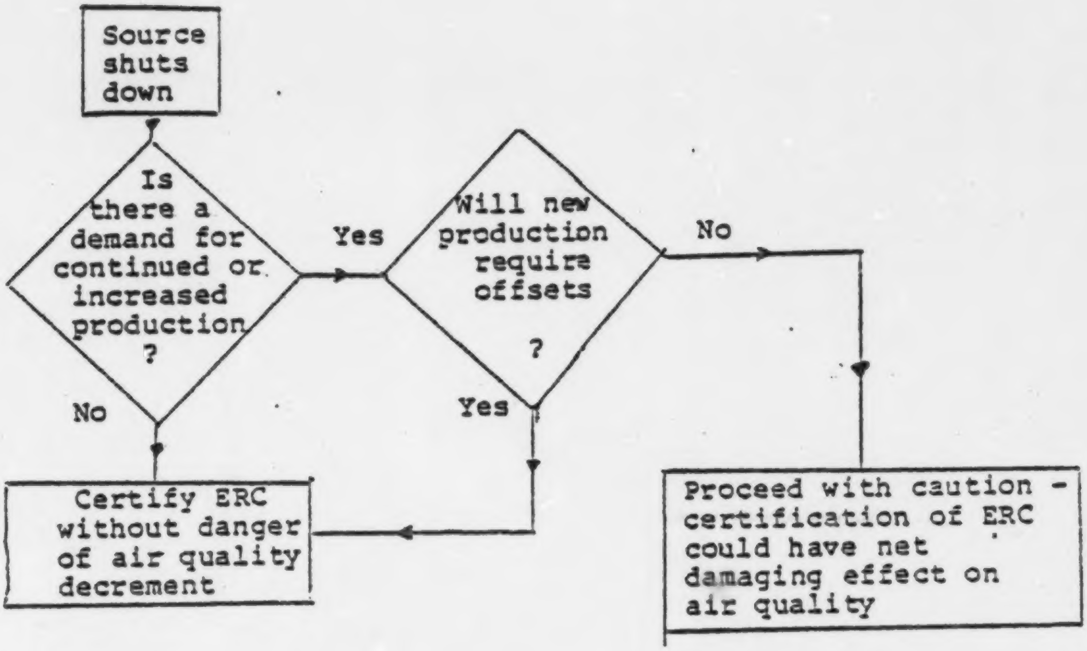
Identifying the paper ERC threat

The possibility of shutdowns generating increases in net emissions, given the certification of ERCs, can arise in the following ways:

- A minor source shuts down, claiming credits, and is rebuilt as a minor source, not requiring offsets.
- A major source shuts down, and one or more minor sources, not requiring offsets, is (are) constructed, to bring net productions of the good or service to the previous level (or higher).
- A source shuts down, and existing sources increase production throughput levels, within allowable limits, without source modification.

The common thread in each of these scenarios is that a shutdown generates ERCs and also induces emission increases that are not legally bound to "consume" some or all of the ERCs generated by the shutdown. This can be illustrated schematically:

Exhibit 1 - Identifying the Possibility of Paper Reductions


Source shuts down
Is there a demand for continued or increased production ?
Yes
No
Will new production require offsets ?
No
Yes
Certify ERC without danger of air quality decrement
Proceed with caution - certification of ERC could have net damaging effect on air quality

POSSIBLE RULES FOR CREATING AND USING ERCs FROM SHUTDOWNS

The key issue in developing a rule granting ERCs from shutdowns is the systematic prevention of granting ERCs for "paper" reductions. In addresssing the problem of displaced demand leading to compensating emission increases, a number of rules, described below, have been suggested.

Each of these rules has its advantages and disadvantages. States and localities are characterized by varying air quality and economic factors, present and projected. Accordingly, as the strengths and weaknesses of these rules apply differently among areas, the appropriate policy will depend on these factors. In some areas, the best policy may represent a combination of these rules, nor are these suggestions exhaustive. Areas should examine their specific needs in devising their own rules concerning emission reductions from shutdowns.

1. Grant ERCs only for shutdowns that are part of a replacement or reconstruction process - Under this rule, ERCs from shutdowns could be used only as offsets for replacement construction. Replacement would not be constrained to the same site; construction at another site would be subject to an offset ratio, as applicable to any external offset transaction. Any remaining ERCs, not used for the replacement, could either be confiscated or made available to the company for banking.

This rule is restrictive, but would prevent the use of the ERCs from causing net emission increases, and would be easy to administer. It would, however, deny ERCs for a large number of shutdowns that do represent "real" emission reductions. This would apply both to shutdowns reflecting permanent local contraction in the demand for goods from the industry, and to cases in which compensating production increases will necessitate major construction or modification, requiring offsets.

2. Grant ERCs for shutdowns, provided their eventual use is restricted to the same industry - This rule addresses the problem of continued demand by earmarking the ERCs for use by facilities in the same industry. It would be relatively easy to administer, requiring few discretionary judgements, and would therefore be relatively free from problems of uncertainty and delay. In addition to allowing the use of the ERCs as offsets for replacement and reconstruction, it would allow their use for new major source construction and modification in the same industry.

This policy is also, however, somewhat restrictive. If the shutdown results from a contraction in demand, then the policy will preclude any use of the ERCs, even though the emission reduction is genuine. The same will be true if the shutdown reflects a geographic migration of that industry (i.e., the resultant increase takes place in another region).

3. Grant ERCs for shutdowns, subject to an elasticity determination - This rule would limit the granting of ERCs to cases in which it could be demonstrated that the shutdown will not cause other sources to increase operations to meet a continued demand for the product or service in question.

This policy would clearly eliminate the problem of "paper" reductions but, in practice, could face problems. Where a source is in an industry that serves a wider geographic area, it is less clear that the resultant emission increases, if any, would take place in the same area, thus the emission reduction from the shutdown could in fact be "real," in spite of a continued demand for the product. Likewise, in many instances the emission increases may necessitate major source construction or modification, requiring offsets. In these cases, "paper" reductions would not pose a problem.

Aside from these instances in which the policy could be overly restrictive, the basic demand determination is likely to face ambiguities. If the firms are faced with the burden of demonstration, it could require analytical resources beyond their capabilities, especially in the case of small businesses. If the governing authority issues a series of prior determinations, by industry, then these could face legal challenges by the firms. The net effect of this would be a tremendous resource burden on the authority, in making and defending the determinations. Either way, these ambiguities could lead to uncertainty and delay, possibly causing the deferral or abandonment of otherwise timely business decisions.

4. Grant ERCs for all shutdowns and curtailments, but impose on them a differential use ratio except in cases of replacement or reconstruction. - This policy, while minimizing administrative burden and uncertainty, would not suffer the drawback of categorically denying ERCs for a large volume of real reductions. Any shutdown that is not part of a replacement process will, potentially, impose a risk of continued demand causing production (and emission) increases elsewhere in the same area. In some cases, as with dry cleaners and gasoline outlets, it is clear that this will happen. In other cases, it may be equally clear that this will not happen, or that the emission increases will require offsets. Many more cases, however, are likely to fall in between; no clear, unambiguous prior determination will be possible. Because of this, a policy entailing case-by-case determinations would likely engender some conflict, as well as imposing a massive resource burden on the authority making the final determination. This rule, by applying uniform treatment to all shutdowns and curtailments, avoids this problem.

Allowing ERCs for all shutdowns, with no restriction on use, would clearly pose a serious threat to demonstration of Reasonable Further Progress. Imposition of the differential use ratio would balance this threat. The ratio would be applied as in the following example:

> A source shuts down, generating 360 tons per year of SO_2 emission reductions. A company plans to construct a new facility, emitting 200 tons of SO_2, at a different site. Through

> modeling, an offset ratio of 1.2:1 is established for this transaction. The use ratio in effect, governing ERCs from shutdowns, is 1.5:1. The permit for the new construction would thus require the full 360-ton reduction (200 times 1.2 times 1.5).

Determination of the appropriate ratio will depend on the nature of the area's industrial mix and projections for future growth and shifts in economic activity. It will also depend on the area's air quality control strategy, specifically the "margin for safety" built into the RFP projections.

5. Grant full credit for emission reductions from all shutdowns, but discount the credit by a uniform percentage each year - Under this policy, applying a ten percent discounting factor, a 360-ton reduction would be worth 360 tons the first year, 324 the second year, 292 the third, etc. In this fashion, a portion of the banked ERCs could, if not used promptly, be used to demonstrate RFP. or be placed in a community bank of ERCs. Again, the ratio should be determined according to the likelihood of paper reductions resulting from shutdowns in the area.

This rule would impose a cost on holding the ERCs over time, as is normally the case with any productive asset held idle. In providing an incentive for prompt use, it would allow and encourage the use of the emission reductions from shutdowns for replacement construction.

* * * * *

SUMMARY - RECOMMENDED POLICY GUIDELINES AND PRINCIPLES

In developing a rule governing the creation and use of ERCs from shutdowns, it is necessary to keep in mind the major principles and objectives of a banking and trading system, and some of the particular policy guidelines identified in this report.

- Do not double count emission reductions via SIP strategy.
- Encoruage replacement of old (and often dirty) facilities
- Minimize complexity and administrative burden. This will also minimize the threat of legal challanges and will provide more certainty to businesses and to regulatory authorities
- Treat shutdowns and curtailments uniformly.
- Leave ownership of the ERCs to the firms creating them.
- Encourage replacement and reconstruction, a process that helps areas to modernize the industrial base, enhance the tax base, and retain jobs, in addition to creating real emission reductions.

These guidelines provide a framework for establishing rules governing emission reductions from shutdowns. Areas will need to recognize the care that must enter into the use of these reductions. Having considered their particular needs and desired, areas can use shutdowns as a strong tool for encouraging new economic development, and for strengthening their existing industrial base.

The Potential of Generating Emission Reduction Credits From Solar And Energy Conservation Under Innovative Reforms In Air Pollution Control

→ 083

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The opinions expressed in this paper are the author's and do not necessarily represent EPA policy.

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INTRODUCTION

Ten years have passed since Congress enacted the Clean Air Act. During that time, controlling air pollution has evolved from attending to complaints concerning minor nuisances to developing comprehensive programs aimed at the achievement of the Act's health-based standards.

To assist state and local agencies with this effort, the U.S. Environmental Protection Agency has developed several innovative reforms for controlling pollution: offsets, bubbles, and banking.[1] By intergrating these reforms into ongoing air programs and encouraging firms to use them, state and local agencies can improve the effectiveness and efficiency of their efforts to control pollution.

A common element to the use of these reforms is the creation of surplus emission reductions. By reducing their emissions beyond required amounts, firms have the opportunity to participate in these regulatory reforms and to lower their overall costs of pollution control.

This paper will analyze the potential of creating "surplus" emission reductions from solar and energy conservation measures. The application of these measures will be examined across the industrial, commercial, and residential sectors. Key issues highlighted include:

- cost of energy saving measures,
- practicality of using the resulting surplus emission reductions,
- consistency of using the reductions in the context of Clean Air Act requirements, and
- administrative demands created by this approach.

REGULATORY REFORMS IN POLLUTION CONTROL PROGRAMS

By imposing limits on emissions, the Clean Air Act required firms to cease using the environment as a receptacle for the by-products of their industrial processes. In satisfying these requirements, firms have made expenditures necessary to achieve cleaner air. To allow firms to minimize their costs of compliance, the U.S. Environmental Protection Agency has developed a program of regulatory reforms. Each reform is described below

THE EMISSION OFFSET PROGRAM

In areas where air quality violates the health-based standards, major new or expanding sources are required to install pollution control technology commensurate with the lowest achievable emission rate. Control technology, however, is not perfect. To safeguard air quality from uncontrolled emissions, new sources must "offset" their emissions with surplus reductions from existing sources. Thus, the emission offset program enables new or expanding firms to locate in nonattainment areas without contributing to an existing air quality problem.

A corollary of an offset program is the creation of an incentive for existing sources to produce emission reductions beyond the levels needed to comply with their permit requirements. A source has the option of using surplus emission reductions it generates to satisfy its own expansion needs or to sell them for a profit to another source.

THE BUBBLE POLICY

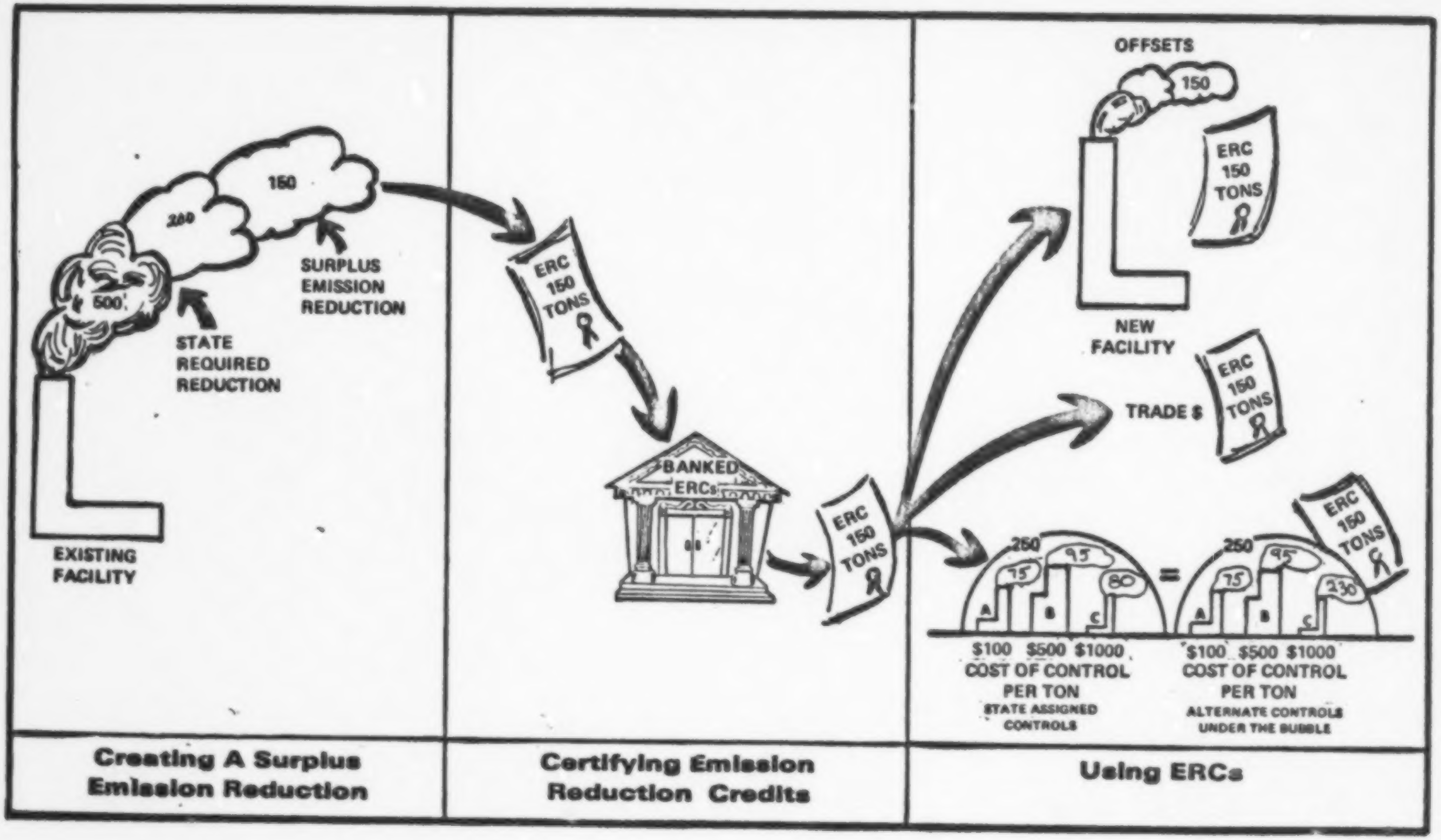
Alternatively, existing sources may want to reduce emissions at one point in a facility to compensate for increasing emissions at another point. In effect, a source creates an imaginary "bubble" around the emission points within its facility. As long as total emissions from the bubble remain constant, the source can vary its control strategy based on the costs of abatement at different points. To use this policy, a source must demonstrate that alternative controls produce emission reductions with at least the same air quality effect and enforceability as the original regulations contained in its permit requirements. Through the use of the bubble, sources can capture substantial cost savings.

THE BANKING PROGRAM

Oftentimes a source may not want to use a surplus emission reduction immediately. In states with banking programs, a source can produce surplus emission reductions, get credit from the air pollution control agency, and save or "bank" these emission reduction credits (ERCs) for future use. Emission reduction credits (i.e., surplus emission reductions) can then be used in offset transactions or bubble applications. By banking their ERCs, sources can decrease the uncertainty and delays sometimes encountered in gaining approval of offset and bubble applications. The source may also discover that once an emission reduction is

Exhibit 1

Emission Reduction Credits and Their Uses Under Reforms in Air Pollution Control


500
200
150
STATE REQUIRED REDUCTION
SURPLUS EMISSION REDUCTION
EXISTING FACILITY
ERC 150 TONS
BANKED ERCs
ERC 150 TONS
OFFSETS
150
ERC 150 TONS
NEW FACILITY
TRADE $
ERC 150 TONS
250
75
95
80
A
B
C
$100 $500 $1000
COST OF CONTROL PER TON
STATE ASSIGNED CONTROLS
=
250
75
95
230
A
B
C
ERC 150 TONS
$100 $500 $1000
COST OF CONTROL PER TON
ALTERNATE CONTROLS UNDER THE BUBBLE
Creating A Surplus Emission Reduction
Certifying Emission Reduction Credits
Using ERCs

certified as an ERC, it can be more readily sold to other sources. This aspect of banking can substantially reduce the overall costs of achieving and maintaining the standards by encouraging efficient, low-cost producers of emission reductions to sell their "commodity". Exhibit 1 schematically outlines the use of ERCs.

Emission reductions eligible for credit can be produced in a variety of ways including, among others, the addition of pollution control equipment, a change in industrial processes, a cutback in operating hours and the closing of a facility. As the supply of available ERCs becomes more expensive to produce, sources will turn to less obvious methods.

One potentially attractive source for ERCs is through the use of solar and energy conservation measures. Due to economic necessity, energy users are increasingly turning to these measures to reduce their fuel costs. A concurrent effect of the reduced reliance on fossil fuel combustion is a decrease in emissions. Although sources are likely to undertake energy saving steps to save money, these steps also result in the production of ERCs. To the extent that ERCs become a valuable commodity to sources, banking can provide an added incentive for the adoption of solar and energy conservation measures.

THE POTENTIAL OF GENERATING EMISSIONS REDUCTION CREDITS FROM SOLAR AND ENERGY CONSERVATION MEASURES

Although the cost savings associated with solar and energy conservation measures will be the primary incentive for changing energy use patterns, the value of potential ERCs could provide a secondary incentive. Critical factors determining the extent to which this may occur are the costs, practicality, legality and administrability of generating ERCs from these measures. These factors are evaluated in the following sections.

COST OF SOLAR AND ENERGY CONSERVATION MEASURES

A firm will only invest its capital in solar or energy conservaton measures if the savings in fuel costs exceed the expenditures. Although the specific cost calculations are beyond the scope of this paper, the following variables would be included in a firm's cost equation for evaluating investments in solar and energy conservation measures:

$$\left[\begin{array}{l}\text{initial capital}\\ \text{outlay for}\\ \text{measures}\end{array}\right] + \left[\begin{array}{l}\text{operation and}\\ \text{maintenance}\\ \text{of the measures}\\ \text{for their lifetime}\end{array}\right] - \left[\begin{array}{l}\text{savings from}\\ \text{reduced energy}\\ \text{consumption over}\\ \text{the lifetime of}\\ \text{the measures}\end{array}\right] - \left[\begin{array}{l}\text{value of}\\ \text{ERCs}\end{array}\right]$$

With a banking program, firms would compare the costs of energy saving measures to lifetime fuel savings and the value of the resulting ERCs. Because of the current uncertainty concerning the value of ERCs, a firm's investment decision would depend primarily on the capital costs compared to anticipated fuel savings.

Solar Applications in the Industrial Sector. In the industrial sector, because of high costs the prospects of most solar technology applications do not appear to be promising. Several surveys have identified the costs of using solar technology to produce industrial process heat.[2,3] Used to produce or treat manufactured goods, industrial process heat accounts for approximately 50% of the energy demand in the industrial sector.

According to a recent EPA survey, solar process heat systems, with a few exceptions (e.g. specific commercial laundry processes, metal can-washing operations, and enhanced oil recovery), are 2 to 15 times more expensive per British thermal unit (Btu) of energy than conventional systems using distillate oil. The survey evaluated 17 solar projects generating industrial process heat. It showed that even with an additional 15 percent tax credit and a 7 year tax life, these systems would still cost significantly more than the distillate oil alternative. Either a substantial increase in the price of oil or an unanticipated technological breakthrough must occur before firms will invest in solar energy.

Two other factors further diminish the likelihood of the widespread replacement of conventional energy systems with solar technology. First, most installations require substantial quantities of land to generate an adequate supply of energy. A small industrial plant, for example, uses approximately 100 million Btus of energy per day and would require over 1 million square feet of land to accommodate solar collectors, or the equivalent of 27 football fields.[4] The availability of large tracts of land at a reasonable price will be a serious constraint on the use of solar energy especially in and around metropolitan areas.

Second, solar technology is now capable of meeting only 35% of the temperature needs of industrial process heat. Although some prototype solar systems can supply heat at temperatures of 550°F and above, most systems generate heat in the temperature range of 350°F Exhibit 2 illustrates the relationship between industrial process heat needs and solar technology capabilities.[5]

Energy Conservation Applications in the Industrial Sector. In contrast to solar applications, the use of energy conservation measures by industry appears more promising. Many firms have already responded to existing monetary incentives for reducing overall energy consumption by instituting short-term, low-cost "housekeeping procedures (e.g. improved thermostat control and use of more efficient lighting).

Over the longer term, firms are looking into the possibilities of using cogeneration technologies as a means of reducing their energy costs. Cogeneration entails the simultaneous production of electricity and thermal energy for use in either industrial processes or commercial/residential heating. More energy is produced for a given fuel input than is possible with conventional, single-purpose energy systems.

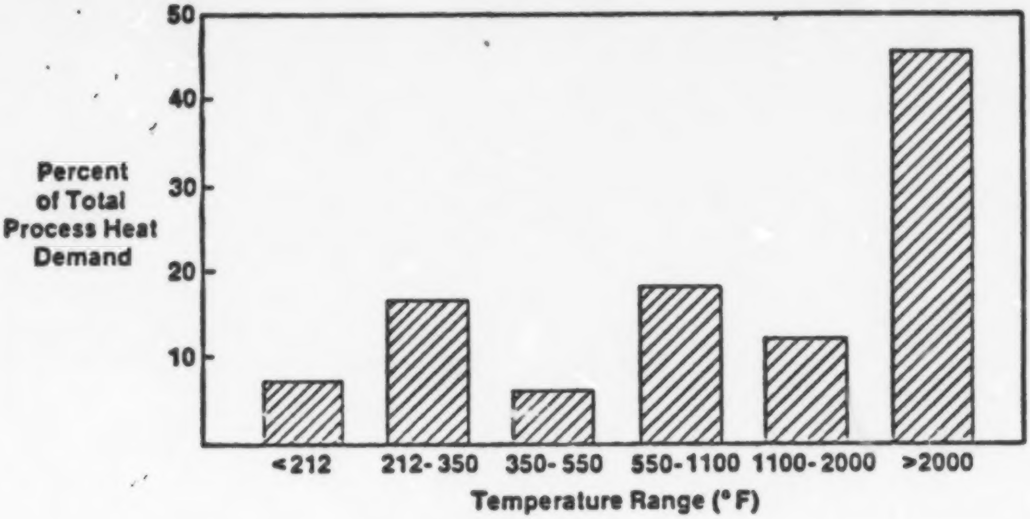
Despite the potential for the economic use of cogeneration, several factors have come to light that cast doubt on the creation of ERCs from this energy saving measure.[6] Because cogeneration can be used to accommodate the demand for energy, it may:

- slow or even eliminate the replacement of older and dirty power plants with new units that meet stringent pollution control requirements,
- reduce the operation of a utility's baseload units which tend to be the newest and lowest polluting facilities,
- exacerbate pollution problems near the site of the cogenerating facility.

Solar and Energy Conservation Applications in the Residential and Commercial Sectors. In the commercial and residential sectors, energy conservation measures are significantly more cost effective than solar applications. Simply through undertaking better housekeeping practices, fuel consumption can be reduced by 10% to 20%.

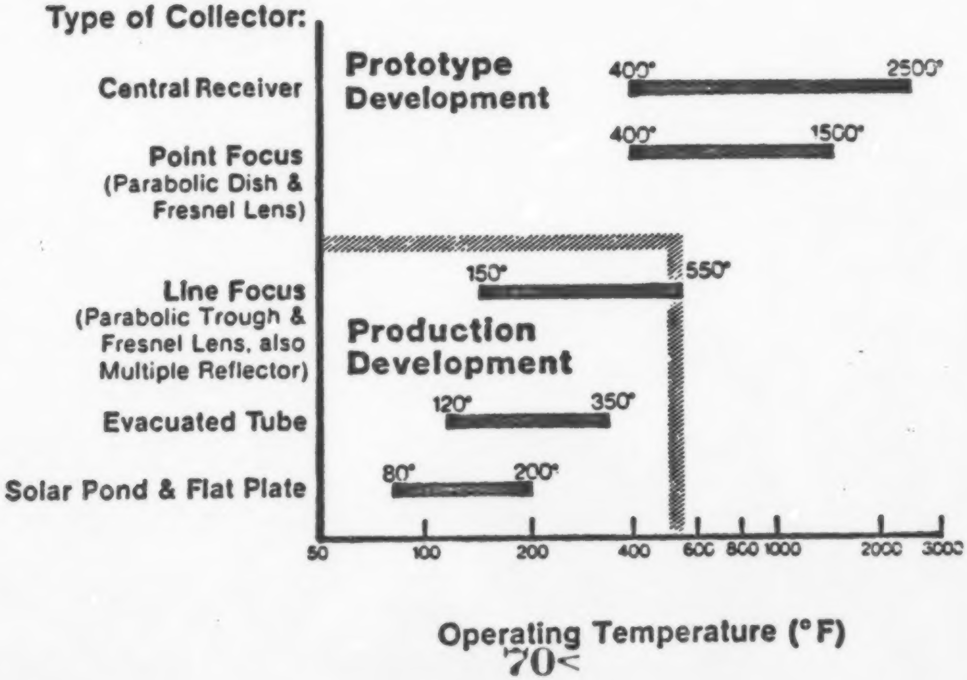
Exhibit 2

Distribution of Industrial Process Heat Demand by Temperature Range (1974)



Source: InterTechnology, 1977.

Practical Operating Temperature Ranges of Several Types of Solar Thermal Collectors for Industrial Process Heat



More extensive energy conservation measures, such as weatherstripping and insulation, would result in more significant savings. However, in both the commercial and residential sectors, owners have been slow to undertake cost effective energy conservation measures because of the lack of sufficient front-end capital.

In the commercial sector, for a typical office building that consumes 380,000 Btus of energy per square foot per year, a fuel savings of 50 to 75% could be captured through an investment of \$4.00 per square foot.[7]

In the residential sector, a \$1,500 to \$3,000 investment in energy conservation in a typical home would produce a 50% decrease in energy consumption.[8] To achieve a comparable decrease using solar technology, a firm would have to invest approximately \$10,000. The energy savings from both solar technology and energy conservation would more than compensate the investor for lifetime capital and maintenance costs. The payback period, however, is much longer for solar than for retrofit measures.

PRACTICALITITY OF CREATING ERCs

From the perspective of individual firms, the value of instituting energy saving measures will depend on the specific types of ERCs by pollutant, the quantity of ERCs, and the geographic limits for use of the ERCs.

Type of ERCs By Pollutant. Reductions in fuel use primarily result in decreases in sulfur dioxide (SO_2), nitrogen oxides (NO_x), and, to a lesser degree, total suspended particulate (TSP) emissions. Hydrocarbon (HC) and carbon monoxide (CO) emission reductions are negligible.

Air quality problems for sulfur dioxide currently exist in the industrialized Ohio basin, in New England around pulp mills, and in the West, around non-ferrous smelters and power plants. From available documentation on completed offset transactions, 15 sulfur dioxide offset transactions have been completed. Using ERCs of sulfur dioxide in the future will depend on the number of areas of the country continuing to have sulfur dioxide problems and the number of major sources for this pollutant locating or expanding in such areas.

The four areas in the country that violate the national air quality standard for nitrogen oxides are Los Angeles, San Diego, Denver, and Chicago. In addition to possible offset transactions in these areas, the attractiveness of using energy savings measures to produce ERCs of nitrogen oxides could be greatly enhanced if this pollutant is firmly established as a precursor of ozone and allowed to offset hydrocarbon emissions.

Quantity of ERCs. The quantity of ERCs resulting from energy saving measures will be depend on the type of fuel displaced (e.g., oil- or coal-fired electric utility and on-site gas or oil units) and its pollutant content (e.g., high/low sulfur oil or coal). Another important consideration is climatic conditions that affect heating and cooling needs and therefore energy consumption. The initial thermal characteristics of the building before a retrofit will also affect energy savings and the amount of ERCs created.

Because of the lack of available data, no information on the likely magnitude of emission reductions from the industrial sector is presented in this paper. However, estimates are presented on the quantity of the reductions possible from the commercial and residential sectors.

Table 1 illustrates the number of "typical" commercial buildings that are needed to generate a ton of emission reductions. It is based on an extensive retrofit program aimed at reducing fuel use by 50%.

Table 1

Number of 50,000 Square-Foot Commerical Buildings Needed to Generate a Ton of Reduction Under a Program to Decrease Fuel Consumption By 50%

Pollutants	Number of Buildings
SO_2	.3
NO_x	.5
TSP	1.6
CO	6.0
HC	21.0

NOTE: Assumptions underlying the table are contained in reference 9.

Although retrofitting a single commercial building can yield more than a ton of reduction in sulfur dioxides and nitrogen oxides, a number of buildings will be needed in most cases to generate a sufficient number of tons for the average offset transaction. Table 2 summarizes the characteristics of offset requirements to date.

Table 2

Quantity of Offsets Required in Transaction to Date
(Tons/Year)

Pollutant	Average	Range	Number of Cases
SO_2	1,226	21-3,763	15
NO_x	714	22-1,300	3
TSP	290	3.5-1,162	39
CO	3,532	91-6,973	2
HC	512	4-3,650	53

Source: Vivian, Wes, and William, Hall, "An Empirical Examination of U.S. Market Trading in Air Pollution Offsets" (DRAFT), University of Michigan, January 1980. NOTE: Due to insufficient data, the exhibit excludes information on 500 offset transactions that occurred in California, and incomplete transactions.

By comparing the information contained in Table 1 and 2, a good approximation of the number of buildings needed to provide sufficient ERCs for a typical offset can be obtained. For example, approximately 464 buildings are needed to generate enough ERCs to fill the requirements of the average TSP offset requirement.

Table 3 shows the number of homes needed to generate a ton of reduction from instituting an extensive 50% retrofit program in different regions of the country.

Table 3

Homes Needed To Generate a Ton Given a 50% Reduction in Total Household Energy Demand

Region	SO_2	NOx	TSP	CO	HC
New England	19	36	166	470	400
South Atlantic	10	17	68	253	1026
Midwest:					
gas heat	8	36	190	460	1333
electric heat	2	14	54	200	816
Southwest:					
Texas	28	22	90	338	1380
California	24	30	124	430	1600

NOTE: Assumptions underlying the table are contained in reference 10.

Based on the information contained in this table and in Table 2, the following observations can be made:

- Many homes must be retrofitted to yield a ton of hydrocarbons, carbon monoxide, and total suspended particulates.
  - In the South Atlantic, the average offset of total suspended particulates would require 19,720 retrofitted homes.
  - In New England, the average offset of hydrocarbons would required 204,800 retrofitted homes.
- Fewer homes are required to produce a ton of sulfur dioxides and nitrogen oxides. However, the number of homes required for the average offset transaction is still high.
  - Although 2 to 30 homes are needed to generate a ton of sulfur dioxide, the average offset would require between 2,500 and 36,800 homes.
  - Fifteen to 40 homes are needed to generate a ton of nitrogen oxides. Approximately 10,700 to 28,600 homes would be required to produce enough ERCs for the average offset to date.

Firms assessing the net costs associated with generating ERCs in both the commercial and residential sectors will be concerned with being able to capture, at least in part, the monetary benefits resulting from the fuel savings. If a firm finances the retrofits but the property owners accrue all the fuel savings, it is unlikely that these energy saving measures will be a worthwhile investment from the perspective of the firm. The average hydrocarbon offset needed by a new firm, for example, could cost between $4 to $6 million if the firm has to subsidize the homeowners 100% for the retrofits.

How can firms capture the monetary benefits from installing energy saving measures? One attractive scheme is for a firm to enter into a legal agreement with individual property owners that requires the owners to pay the firm a portion of the savings from their lower fuel bills. The contributions would occur over time and reflect the time value of money.

To ensure that benefits are derived by both the firm and individual property owners, the percentage repaid by the owners should be less than their total fuel bill savings. In this way, the firm receives partial repayment of its capital investment plus the resulting ERCs, while the property owners benefit from lower fuel bills.

GEOGRAPHIC LIMITS FOR USE OF ERCs. A primary concern of firms is the geographic boundaries for using their emission reduction credits. Two questions are central to such an assessment: How widely dispersed were the sources used to create ERCs? Have any of the emission reductions occurred in an area distinct from the site where the energy saving measures were instituted?

Creating ERCs from the residential sector will probably involve a large geographic area. Their use is likely to be limited to a specific site.

Solar or energy conservation measures targeted at reducing electricity demands should result in emission reductions being produced some distance from where the actual measures are instituted. For example, retrofitting homes heated by electricity will reduce emissions at the site of a power plant that could be miles away. This will limit a firm's ability to use these ERCs within the vicinity where the measures were instituted. Such a discrepancy between the site of the energy saving measure and the area where the emission reductions actually occur is important because firms must demonstrate that the ambient air quality impact of their increases in emissions are counterbalanced by the ERCs they plan to use.

CONSISTENCY WITH CLEAN AIR ACT REQUIREMENTS

Only emission reductions that are in conformance with the requirements of the Clean Air Act can be banked. A regulation explicitly laying out these requirements is being developed by EPA and will be published in proposed form by September 1980. In brief, the requirements are as follows:

(1) To Be Eligible for Credit Emission Reductions Must Be Beyond Reductions Required in an Approved 1979 State Implementation Plan.

Firms can only get credit for those emission reductions resulting from solar and energy conservation measures that are not part of a state's attainment strategy. Prohibiting firms from receiving credit for reductions that a state has included in its plan will preserve the state's ability to comply with the Clean Air Act requirement of yearly progress towards attainment of the health-based standards. If firms were given credit, double counting of reductions would occur -- first, as part of the demonstration of attainment, and then as a credit usable in a bubble or offset application -- and air quality would suffer.

(2) All Emission Reduction Credits Awarded to Solar or Energy Conservation Measures Must Be Shown to Be Real Reductions.

To preserve the integrity of state implementation plans, only measures that result in actual reductions in pollution can be used as offsets or in a bubble. Firms must demonstrate to the air pollution control authority that their actions produce measurable and not just "paper" reductions. If firms were permitted to use emission reduction credits based on reductions that only occurred on paper, air quality would be impaired. As a result, states would have to assess further control on existing firms within their jurisdiction to compensate for the use of phony reduction credits.

(3) Firms Can Only Receive Emission Reduction Credits for Solar and Energy Conservation Measures That Result in Permanent Reductions.

Before a firm can receive credit for solar and energy conservation measures, it must demonstrate that the measures produce emission reductions that are continuous over the lifetime of the proposed use of the offset. For example, a firm may be awarded credit for installing insulation that deteriorates over time. The resulting emission reduction credits after deterioration begins will undermine the state's progress towards attainment of the standards. In such cases, the amount of credit awarded must account for the diminution of reductions over time.

(4) Emission Reduction Credit Must Be Legally Enforceable Under a State Implementation Plan.

Before a firm undertakes a particular solar or energy conservation measure to generate ERCs, it must demonstrate that the reductions will be enforceable. On site measures installed in an industrial facility are most likely to satisfy this requirement. However, firms opting to use a decentralized approach for generating reductions (e.g., energy conservation retrofits in the residential sector) will have difficulty demonstrating the enforceability of these reductions.

ADMINISTRATIVE DEMANDS

The administrative demands of crediting ERCs to particular solar and energy conservation measures rests on the ability of the air pollution control authority to verify, certify and enforce the decreases in emissions within its resource constraints. Good administrative accounting procedures are essential to a program enabling sources to get credit for emission reductions from energy saving measures.

Because of the small size of emission reductions from solar and energy conservation applications in the residential sector and their widely dispersed location, firms will have difficulty developing credits of sufficient quantity and adequate spatial characteristics to be used in bubbles or offsets. The difficulty of enforcing individually assigned emission limits for many separate sources also creates problems. In combination, these difficulties raise serious questions on whether the administrative burden on regulatory agencies and on potential users of the ERCs -- both of whom would have to deal with a multitude of sources -- would outweigh the value of the resulting credits.

How can these difficulties be overcome? One approach that could be taken to deal with these problems is to assign ERCs stemming from solar and conservation efforts not to individual sources but to local governments or other groups (i.e., electric utilities) that have the possiblity of influencing areawide energy consumption. For example, if local governments publicized and operated retrofit programs for households or passed housing code standards requiring a high level of insulation in new houses, the payoff in emission reductions could be quite high. Moreover, the usability and enforceability of the reductions would be much more practical, and the financial benefits that would accrue to a single institution that was able to capture and sell large enough units of aggregated small reductions might be sufficient to help finance a program intended to encourage energy conservation.

Consequently, areas developing banking programs should seriously consider assigning the rights to create ERCs from decentralized solar and energy conservation measures to sources that have the power, incentives, and institutional framework for encouraging, creating, and capturing the potential emission reductions from small-scale energy saving applications. Because electric utilities already have this capability through their billing procedures, they would be prime candidates. For selected places, further investigating this idea may be worthwhile.

CONCLUSION

Because of economic necessity, energy users are increasingly turning to solar and energy conservation measures to reduce their fuel costs. Given current technology, energy conservation measures are substantially more cost effective than solar applications. This is true across the industrial, commercial, and residential sectors.

Although legal and administrative issues may constrain the use of emission reduction credits that have been produced from energy saving measures, the development of innovative institutional arrangements may overcome these obstacles. In the future, the potential benefits of this program are likely to be realized as air pollution control agencies search for new avenues to achiair quality and as firms strive to lower their control costs.

REFERENCES

1. A fairly extensive literature has been developed on these innovative reforms. For more information contact U.S. E.P.A.'s Emission Offsets, Banking and Trading Project, PM-221, 401 M Street, S.W., Washington, D.C. 20460, (202) 755-0933.

2. Brown, Ken, "The Use of Solar Energy to Produce Process Heat of Industry." SERI/TP-731-626, Solar Energy Research Institute,Golden:Colorado, April 1980, pp. 3-8.

3. ICF, Inc., "A Survey of the Current Status of Solar-Supplied Industrial Process Heat." Prepared for the U.S. Environmental Protection Agency, March 1980.

4. The calculation for the number of square feet of land needed to accommodate solar collectors for a small plant that uses 100 million Btus of energy per day is as follows:

   Collector output:
   $4 \text{ kwhr/m}^2 (3400 \text{ Btu/kwhr}) = 13{,}600 \text{ Btu/m}^2 \text{ day}$

   Needed energy input for the plant:
   $100 \times 10^6 \text{ Btu/hr} (16 \text{ hrs}) = 1.6 \times 10^9 \text{ Btu/day}$

   Needed area of collectors for the plant:
   $1.6 \times 10^9 \text{ Btu/day} / 1.36 \times 10^4 \text{ Btu/m}^2 \text{ day} =$
   $1.176 \times 10^5 \text{ m}^2 = 1.24 \times 10^6 \text{ ft}^2$

5. Brown, Ken, "The Use of Solar Energy to Produce Process Heat for Industry." SERI/TP-731-626, Solar Energy Research Institute, Golden:Colorado, April 1980, pp. 3-4.

6. General Accounting Office, "Cogeneration--What It Is, How It Works, And I ts Potential Development As An Energy Conservation Measure." April 29,1980, Appendix VIII.

7. ICF, Inc., "Oil Import Reduction: An Analysis of Production and Conservation Alternatives." Prepared for the Task Force on Synthetic Fuels - Senate Budget Committee, August 30, 1979.

8. Williams, Robert H. and Marc H. Ross, "Drilling for Oil and Gas in Our Buildings." Center for Energy and Environmental Studies: Princeton University and Department of Physics: University of Michigan, respectively, July 17, 1979.

9. Assumptions Underlying Table 3 are the following:

Primary Energy Use
380×10^3 Btu/sq.ft./yr
- heating consumes 36%
- cooling consumes 23%
- lighting/machines consume 41%

Energy System
gas heat with all other energy needs supplied by electricity generated at an oil-fired power plant.

Emission Factors (lbs/10^6 Btu)

TSP .15 if electricity, .01 if gas
SO_2 1.0 if electricity, .001 if gas
NO_x .6 if electricity, .2 if gas
CO .04 if electricity, .02 if gas
HC .01 if electricity or gas

Sources:

ICF, "Oil Import Reduction: An Analysis of Production and Conservation Alternatives." Prepared for the Task Force on Synthetic Fuels - Senate Budget Committee, August, 1979.

U. S. Environmental Protection Agency Office of Air and Waste Management/ Office of Air Quality Planning and Standards, "AP-42 (Part A): Compilation of Air Pollution Emission Factors." August 1977, pp. 1.1-1 to 1.4-3.

10. Assumptions Underlying Table 5 are the following:

I. Annual end-use energy budget (10^6 Btu)

	Space Heating	Hot Water	Cooling	Lighting/ Appliances
New England	104	14.8	7.8	29.6
South Atlantic	60	14.8	10.0	29.6
Midwest	90	14.8	7.8	29.6
Southwest	9.3	14.8	31.6	29.6

Source: Office of Technology Assessment, Residential Energy Conservation Volume I, U.S. Government Printing Office, Washington, D.C., July 1979.

II. Energy Systems

New England	Oil heat and hot water with electricity supplied by an oil-fired plant (49% of the systems in New England exhibit these characteristics).
South Atlantic	All electric home with electricity supplied by an oil-fired plant (76% of the systems in the South Atlantic states exhibit these characteristics).
Midwest:	
gas heat	Gas heat and hot water with electricity supplied by coal-fired power plants (49% of the systems in Midwest exhibit these characteristics).
electric heat	All electric home with electricity same as above (48% of the systems in Midwest area exhibit these characteristics).
Southwest:	
Texas	All electric home with electricity supplied by an oil-fired power plant (62% of the systems in Texas exhibit these characteristics).
California	Gas heat and hot water with electricity supplied by an oil-fired power plant (61% of the eystems in California exhibit these characteristics).

Source: Ibid, p. 297.

III. System Efficiences

Electricity	.29
Gas	.60
Furnace	.50

Source: Ibid., p. 60.
Williams, Robert H. and Marc H. Ross, "Drilling for Oil and Gas in Our Buildings", Center for Energy and Environmental Studies: Princeton University and Department of Physics: University of Michigan, respectively July 17, 1979.

IV. Emission Factors (lbs/10^6 Btu)

	TSP	NO^x	HC	CO
Electricity	.15	.6	.01	.04
Domestic oil furnace	.02	.14	.01	.04
Gas	.01	.2	.01	.04

	SO_2
New England	1.0(1% sulfur oil) for electricity, .33 (.3% sulfur oil) for domestic oil system
South Atlantic	same as above
Midwest:	
Gas	.001
Electric	3.8(2.3% sulfur coal) for electricity
Southwest:	
Texas	.5(.4% sulfur oil) for electricity
California	.001 gas, same as above for electricity

Sources: State Implementation Plans
U.S. Environmental Protection Agency, Office of Air and Waste Management?Office of Air Quality Planning and Standards, "AP-42 (Part 4): Compilation of Air Pollutant Emission Factors." August 1977, p. 1.1-1 to 1.4-3.

81-52.2

INDIRECT OFFSETS

A Supplemental Program to Facilitate Interfirm Trades in Emission Reductions

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INDIRECT OFFSETS

A Supplemental Program To Facilitate Interfirm Trades In Emission Reductions

By now most of us are familiar with the "offset policy" introduced by EPA in 1976 and revised in 1979. 1/ The policy responded to the need to protect air quality against further degradation in nonattainment areas while still allowing opportunities for further economic growth. Congress incorporated the policy into the Clean Air Act as amended in 1977.2/ It allows for the construction and operation of major new or modified sources so long as sufficient additional "offsetting" reductions are provided from existing sources to compensate for the newly produced emissions and assure reasonable further progress toward attainment. No net increase in pollution is allowed.

Despite the advantages of the offset policy, a number of problems remain. Prospective firms that would like to participate in an offset program are faced with significant uncertainty regarding the costs, availability and timing of offsets. Major new source construction or major modifications of existing plants may be delayed or possibly cancelled if a firm contemplates lengthy searches and negotia~~tia~~tions for offsets. Existing sources in nonattainment areas that are capable of generating emission reductions receive inconsistent and sometimes conflicting incentives in response to the fluctuating demand for offsets. Regardless of the potentially significant economic benefits of cross-firm (external) offsets, over 90% of the new sources continue to reject this possibility in favor of within firm (internal) offsets where the cost and availability of offsets is known. This not only fails to achieve the economic efficiencies of a wider market, but also increases the likelihood of discrimination against smaller firms and those not currently operating in nonattainment areas.

From a regulatory perspective it is now time to look for new and improved ways to encourage industries to cost-effectively meet emission control requirements, while reducing delay and uncertainty, without losing sight of the goal to protect and enhance air quality as mandated by the Congress. One new possibility, which is particularly applicable to new or expanding hydrocarbon sources forming ozone, is "Indirect Offsets." It is actually a combination of the offset policy provisions and an emissions fee. The concept has been suggested both by the National Commission on Air Quality and several individuals at EPA.3/

How An Indirect Offset System Would Operate

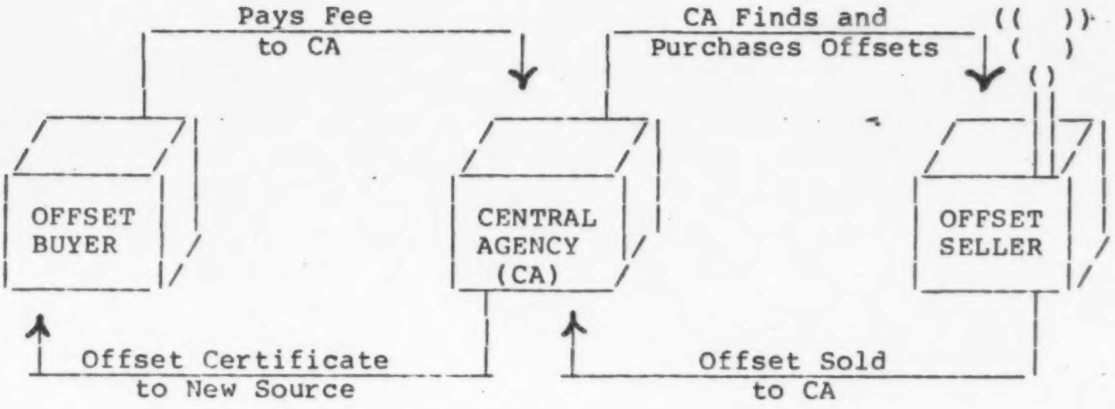
Indirect offsets can supplement the current offset policy and act as a vehicle to increase certainty in business decisions while still protecting our air quality. In effect, after having met the applicable new source emission limits, the potential new source would have three options for meeting offset requirements. The new source could either:

- Reduce emissions internally (internal offset);
- Directly acquire offsets from another source (direct external offset); or
- Pay a fee proportional to new emissions to an authorized agency to be used by that agency for the purchase of offsets (indirect offset fee).

An indirect offset policy allows for the introduction of a third party into the offset system. The role of this third party would be assumed by a "central agency" (CA), 4/ and its purpose will be to provide the opportunity for a new source or existing source expanding in a nonattainment area (for writing ease "new source" will also include "modified source") to fulfill its offset requirements at an established price. A new source, once it pays a fee for the prescribed number of offsets, would be assured of meeting its offset obligations. The phenomenon of "risk aversion" (increasing uncertainty disproportionately decreases the equilibrium level of investment) is reduced because the new source will gain certainty that all its offset requirements can be met through the payment of the required fee. The CA would be able to provide reasonable assurance of finding offsets as well as maintaining air quality by setting the fee sufficiently high.

The indirect offset system will supplement rather than replace the existing offset policy. No source will be required to participate in the program. Introduction of sufficiently high fees will encourage sources to directly purchase offsets and reserve the fee option as a "safety valve." Once a firm elects to meet its offset requirements by paying a fee to the CA, the CA is then bound to use the fees collected to purchase offsets. The fee will be based on the estimated market price of offsets on a per ton basis, plus an adequate margin of safety to ensure the CA can meet its obligation to maintain air quality. Initially, the market price would be derived from the weighted average marginal cost of control plus a premium to cover both the transaction costs and to provide an incentive for the offset seller to participate in the program. See Figure 1.

Figure 1



Major Advantages of An Indirect Offset System

There are three major advantages to an indirect offset system: increased certainty that a new source will be able to obtain necessary offsets; a reduction in the amount of time it currently takes to find and secure external offsets; and creation of long-term incentives for existing sources to adopt innovative practices so as to reduce emissions in order to produce offsets for sale.

The initial major advantage is that a new source entering a nonattainment area will be faced with less uncertainty regarding its ability to meet permitting requirements. The new source may continue to look for offsets or for cost-effective internal emission reductions in order to further reduce costs, but it is assured that it can meet its offset obligations upon payment of the indirect offset fee to the CA. The new source need not take any further action in regard to acquiring offsets before it begins construction.

Second, the time delays involved when a potential new source looks for offsets can be costly and in some cases prohibitive (i.e., preventing it from entering a specific area). Ironically, discussions with industry have frequently revealed that uncertainty and delay are far more significant than the cost of pollution control equipment itself, yet delay and uncertainty neither foster economic development nor contribute to cleaner air. Cutting the amount of time involved in searching for and purchasing offsets effectively reduces a firm's transaction costs. Just as merchants in the business community are able to reduce costs to consumers by doing the underlying research and bringing together information and goods, a CA, after collecting the necessary data and doing the preliminary studies,5/ would serve a clearinghouse function for those firms interested in buying or selling offsets. This advantage can be a major benefit to smaller firms not able to support the legal and technical staff currently necessary to enter the offset market.

The third major advantage will help remedy the fact that most existing sources are currently reluctant to participate in an offset market. Rather than creating offsets and operating in a risky market, most firms desire not to get involved in trading external offsets. However, an indirect offset program would establish a viable offset market on both the supply and demand sides. If an existing source is aware that a CA has funds and is willing to pay an agreed to price, then accurate calculations can be made to determine the net cost or benefit involved in producing offsets. Existing sources can then make an informed decision whether it is worthwhile to undertake an emissions reduction program -- whether the payback is worth the investment.

Beyond the three major advantages expected to be gained by an indirect offset system, four secondary advantages should accrue if the fee is correctly set. The fee should:

1) Encourage new sources to reduce emissions so as to reduce the number of offsets they must purchase;

2) Provide an incentive for innovation by encouraging older sources that can efficiently control emissions to do so by providing a continuous market for the offsets created;

3) Avoid unnecessarily discouraging new sources from entering a nonattainment area; and

4) With the current policy stating that offset trades must be accomplished on a greater than one-for-one exchange, actually reduce the total emissions in an area in the long-run.

The discussion now turns to the dynamics of fee setting, keeping in mind the advantages sought to be gained by an indirect offset system.

Setting The Fee

It is immediately understandable that the degree of certainty in an indirect offset program's success is dependent on the fee a firm is willing to pay for the CA's service. Higher fees will increase the program's long-run certainty because they will increase the CA's ability to purchase sufficient emission reductions to offset new source emissions. Rarely in our imperfect world is 100% certainty required.6/ However, for industry to perceive the program as worthwhile, indirect offsets must be able to provide greater certainty than is found in our present system.7/ For example, if a new source is willing to pay one and one half times the estimated long-run market price for offsets, then the CA will be able to secure offsets with a fair amount of certainty.

A newly created CA must begin by determining the indirect offset price.8/ When attempting to set that price at least three dynamics must be taken into consideration:

1) How the established fee will increase business certainty and how effectively the indirect offset system can operate as a safety valve when offsets are difficult to obtain directly;

2) How the fee price will affect the market for offsets purchased directly from existing sources; and

3) How the fee level will affect the CA's ability to purchase offsets needed to protect air quality.

The following subsections will elaborate on these three dynamics.

1. Indirect Offsets As A Safety Valve

Primarily, the indirect offset fee system will act as a safety valve option to maximize certainty and avoid delays arising from difficulties in obtaining offsets. During a specified planning horizon, potential new sources can be assured that, regardless of temporary variations in the offset market, / They it can meet its obligation to secure offsets by paying the previously established fee. If a new source feels the fee is excessive it is, of course, free to avoid the fee by internally reducing emissions or directly purchasing offsets. But, if the fee is too high the system's effectiveness as a safety valve can be destroyed.

Because the initial fee a CA charges must be based on data concerning the amounts and type of offsets available, the CA should simultaneously know whether it can meet a new source's demands. Therefore, a CA should be able to avoid being caught in a situation where offsets are not available. Since the offset fee charged may be greater than the cost of directly negotiated offsets, a new source will desire something extra for its money. The offset fee can be viewed in terms of an insurance policy which is intended to increase certainty and peace-of-mind as opposed to directly decreasing costs. Just as insurance companies provide peace-of-mind to motorists, it should be stressed that offset fees will provide insurance like guarantees against major disruptions in the new source permitting process.

2. Effects on the Current Offset Market

The second dynamic raises concern that the market for direct offsets will be undercut if the offset fee charged to a new source is too low. An artificially low fee will destroy the new source's incentive to search for offsets. Somewhat higher offset fees charged to new sources will significantly increase the probability that they will continue to look toward existing sources for offsets or reduce emissions internally rather than pay the fee. Yet, if the offset fee is set too high, there is a concern that this will send a false signal to existing sources and encourage short-term hoarding caused by unrealistic expectations of long-term profits.

Just as too low a fee charged to a new source will destroy the direct offset market, if the CA routinely pays an artificially high price to purchase offsets from existing sources the market will also be destroyed. The price a CA is willing to pay for offsets must be based on supply and demand in the market and not on the size of the fee collected. Otherwise, existing sources with offsets to sell will be encouraged to raise their prices and sell only to the CA. The result would be a distorted market with increased social costs.

While the authors of this paper recognize the possibility of significant short-term variations in market price based on "gaming" or unjustified expectations of existing sources, we anticipate the long-run price to be a factor of supply and demand for offsets (rather than price of an offset fee) and will tend to stabilize at the equilibrium level. A CA can effectively employ a bidding or auction system to obtain offsets at the least cost and thereby minimize the potential for disruption of the direct offset market.

3. Uncertainty Regarding CA's Ability To Obtain Offsets

The third and most important concern regards the impact the fee level will have on the CA's ability to provide sufficient actual emission reductions. Some uncertainty is encountered here. Remember, the primary advantage of the proposal is that it provides increased certainty for industry, without increasing air pollution, but one of the tradeoffs is that it increases the uncertainty for the CA. Clearly, higher fees charged to new sources will simultaneously reduce the demand for indirect offsets and increase the per ton revenues for the CA to find and purchase offsets. Although no fee will provide absolute certainty of offset availability, higher fees will increase the certainty that sufficient revenues for offset purchases will be available.

Although fees must be sufficient to cover the expected long range equilibrium price of offsets plus a factor of safety, it is not clear that long-term environmental interests are best served by setting an arbitrarily high fee. If the fee is set too high it may lose its value as a safety valve and refocus political efforts on removing the offset requirement altogether.

2 Providing for greater industrial certainty and still recognizing the possibility of miscalculations while setting the appropriate fee, several systems are available for limiting the scope and extent of potential environmental losses. One method would be to require a significant increase (20%-30%) in the fee charged to all new sources whenever it becomes evident that the previous year's fee proceeds were not sufficient to cover the purchase price of the required amount of needed offsets. Fee levels could be adjusted in accordance with a previously approved schedule. This would protect air quality and provide potential new sources with information stating the maximum amount of fee level fluctuation for a stated period of time. This approach provides additional revenue to balance the deficits caused by previously low offset fees. It would not, however, establish a maximum limit to any physical offset deficit (i.e., air quality could theoretically still diminish if calculation errors were severe). Therefore, this fix is not completely acceptable.

A second response to reducing the physical offset deficit is to establish a specific maximum limit in the net increase of emissions that would be allowed to exist at any one time. While this response would limit the extent to which the air quality might deteriorate, it would not provide the CA with revenue to correct earlier errors resulting from setting the fee too low.

The most appropriate response would be a combination of the two approaches. This would allow fee levels to increase in order to correct limited deficits while mandating that the fee system could only operate so long as total actual emissions did not exceed certain pre-established limits. A stricter approach would be to limit operations (but not construction) of the new source until all the necessary offsets were obtained. Under this plan there would be no danger of emission increases, but industry may oppose this alternative as being too risky.

✓ It is also possible that the CA will have overestimated its costs, and therefore charged new sources too much. This would result in excess funds in the hands of the CA even after all required offsets were purchased. Since CA's are not formed as profit maximizing organizations a mechanism should be installed either to rebate a percentage of the money to new sources, to facilitate banking the money for future CA use, or purchase extra emission reductions and "bank" them as a growth cushion. A system that depends on rebates has the added advantage of being able to initially charge a higher fee since the offset user

Banking the unused portion of the fee will add flexibility to CA procedures and can be counted on as part of a contingency plan if the CA errs in its projected costs. The disadvantage in a rebate system occurs at the initial price setting. The offset price will tend to be higher and therefore less acceptable to potential new sources. If the money is banked, the major disadvantage is the potential new source's perception that a CA has set the price higher than necessary.

Regardless of which alternative the CA develops to limit the uncertainties of an indirect offset system, one should recognize that there are other much more serious uncertainty problems within any air quality management program. Monitoring, modeling, and emission inventories are all considerably less than perfect. Even within the current offset system no absolute air quality certainty is provided. Mobile sources, minor sources and non-point sources of all kinds are frequently exempted from the provisions of the offset policy. Therefore, even if the current offset policy were rigidly adhered to it provides no absolute guarantees against limited decreases in air quality. This is not to say we should be satisfied with the current program and agree to its imperfections as part of the status quo in new supplemental approaches. Rather, it is to say those current imperfections must be recognized as the starting point for efforts to improve the program. The indirect offset fee offers one way to effect incremental improvements by increasing industrial certainty without posing significant threats to air quality.

Will Existing Sources Sell Offsets?

One frequently voiced concern relates to indirect offsets as well as direct offsets. It deals with a perceived preference of some industries to hold offsets rather than to sell them, even where the potential for significant profit exists. Although no market system can be completely free from the possibility of short-run hoarding or gaming, the proposed indirect offset system can potentially alleviate this problem in at least three specific ways:

- The current offset market is analogous to a primitive subsistence economy in which producers occasionally sell their accidental surplus rather than plan and produce goods for sale. An indirect offset program can, by providing a constant and credible buyer, significantly increase the incentive to plan and produce offsets for sale.

- The current market is exceedingly thin, with a mismatch of offset sizes and lengthy and uncertain transactions. An indirect offset system can provide the opportunity to pool the demands of many new sources to buy in bulk and match the supply of a single larger potential seller. This is important because offsets are not fungible and cannot be produced in discrete units.

Adding extra controls will produce say, 142 tons of reduction, not 100 tons. To the extent potential offset producers are confident they can sell surplus reductions, they are more likely to produce them.

- A potential offset seller under the current situation is faced with major uncertainty about the availability of future offsets if he should need them at a later time. Thus, a firm with only limited prospects for expansion may still refuse to sell offsets at a profit out of the fear that any future offsets may be completely unavailable. In a risk averse firm this remote possibility of needed, but unavailable offsets, may loom so large as to preclude economically rational behavior. By promising that offset requirements can be met by paying the fee, an indirect offset system can assure that production will not be delayed because of possible difficulties in finding offsets. Therefore, indirect offsets will encourage a greater willingness to participate in profitable market transactions between firms in a given area.

The paper now turns to other areas where an indirect offset program can have potentially significant effects to improve air quality. These areas are in some ways controlled by regulatory programs at EPA, but the cost-effectiveness of current regulations is the subject of some concern. Indirect offsets may be applicable to issue areas such as minor source control and innovation where there are currently few incentives to control emissions.

Potential Application to Mobile and Minor Sources

Thus far, the paper has only discussed major, stationary sources of pollution. Mobile sources can generally be said to produce between 40-50% of the total air pollution problem. Further, minor stationary sources (less than 100 tpy) are also responsible for a large percentage of total stationary source emissions. Fortunately, an indirect offset program can also be directed at these emission types.

Political realities infrequently allow the government (even if it desired) to shut down very large firms for noncompliance-- witness the government's affirmative intervention on behalf of Chrysler and rollback of deadlines for auto industry compliance schedules. Mobile source pollution reduction, like stationary source control, may be best accomplished by an abatement program that encourages incremental steps toward a final goal.

The indirect offset program can provide a framework that begins to internalize the costs of pollution abatement. Application of an offset fee, or nonconformance penalty, to each vehicle that exceeds established emission limits will produce revenues which may later be used to conduct an inspection and maintenance program or to purchase offsets from existing stationary or mobile sources. The revenues from the offset fee could be collected and then distributed proportionately to area CA's based on the number and types of vehicles sold in that area. The only restriction placed on the area CA would be that the revenue must be used to purchase emission reductions to offset emission increases caused by the nonconforming vehicles. Calculation of the mobile source offset fee, like its stationary source counterpart, would primarily be based upon the cost of buying equivalent offsets.

Excessive administrative burdens under current regulatory programs make control of minor sources extremely difficult if not infeasible. However, under an indirect offset program the uncontrolled minor sources in nonattainment areas could be be combined by industry classification into one major-like source. All these minor sources could then be subjected to indirect offset fees based on emissions if the manufacturer does not produce equivalent controls. Where reductions are cost-effective these sources would of course be eligible to sell offsets to the CA or directly to private sources. In either case the CA benefits by gaining revenues or increasing the amount of offsets available. The community benefits from cleaner air and economic development. Ideally, trade associations could be solicited to encourage individual small firms to participate in the program. Trade associations' incentives arise from funds the CA will pay association members when buying the offsets. It should be noted that indirect offsets cannot completely reduce administrative burdens associated with controlling minor sources. But the program can produce the means and economic incentives needed to encourage minor sources to contribute more than they presently do to air quality enhancement.

Impacts on Innovation

A vendor of innovative air pollution control equipment is normally severely constrained by an inability to provide "in use" proof that the untried equipment will fully perform at the prescribed level once installed. Yet, buyers who face potential shut down if the equipment does not perform up to SIP required levels, naturally want to see the new equipment actually perform before signing a contract to install it in their facility. This is a major obstacle which thwarts innovation and causes the state of the art in pollution control technology to remain rather static. Potential buyers lose the opportunity for significant cost savings and the community is denied more efficient pollution control.

An indirect offset system can avoid this "Catch-22." A guarantee provided by the vendor would increase existing sources' acceptance of unproven equipment. The guarantee would consist of a contractual promise by the vendor to provide any necessary offsets to the existing source if the new equipment does not function at the anticipated level. In essence, the vendor would be selling a performance guarantee with his invention which would prevent any serious business interuption. The vendor in turn backs up his promise by reaching agreement with the CA as to the applicable indirect offset fee rate, or by directly purchasing options on offsets. The vendor's appearance in the program heightens its technology forcing aspects. If the CA can provide offsets to either the existing source or to the vendor to provide to the existing source, the vendor is more secure and can take risks on the performance of innovative concepts and equipment never before tested in actual full-scale use-- and this can all be accomplished without sacrificing air quality.

The list of benefits to be gained by the CA providing this type of service include:

- greater certainty to new sources that offsets will be produced and made available;
- innovative control techniques are encouraged without fear of disrupting production schedules if they do not work because the performance guarantee insulates the experimenting source; and
- emissions are reduced more rapidly in cases where the innovative device meets its expectations.

The list of costs appear to be small:

- potential delays in compliance where the innovative equipment is used and completely fails;
- complication of procedures by introducing possible legal battles involving vendors;
- increase in CA's duties by introducing an options market in offsets; and
- possible dissatisfaction with "subsidizing" the vendors of air pollution control equipment.

Most of these risks are present in the existing system and would be reduced by supplementing with the indirect offset fee approach.

Enforceability and Other Considerations

The Clean Air Act (CAA), as amended in 1977, bases emission levels on health standards. The CAA shows a Congressional intent to protect human health from the dangers of air pollution. Therefore, any new system must contain explicit procedures not only to maintain air quality but also to improve it.

Systems must be maintained to monitor existing sources' emission reductions, to impose legally enforceable sanctions that may be levied against existing sources that do not comply, and to legally protect a new source which has paid a fee to the CA.

The CA in charge of indirect offsets must have the ability to assure that an existing source has actually reduced emissions equivalent to the amount established in the offset deal. Without the ability to check an existing source's actual reductions (as opposed to calculatd or paper reductions) there is a danger of fraud--the CA would be paying a firm that did not adequately reduce emissions. It is a fact of life that a monitoring and enforcement program cannot operate without some form of enforceable sanction. Noncompliance penalties must, and do negate any benefit an existing source has gained by not creating emission reductions. Such a system must take away the economic incentives a firm would otherwise have not to comply. Any fines recovered by the CA would best serve the community and indirect offset program if they were used to purchase the additional offsets needed to counterbalance the existing source's failure to reduce emissions. In effect, the civil penalty itself becomes an indirect offset fee.

One alternate method to force existing sources into meeting purchase agreements to reduce emissions would be to allow the CA authority to file for an injunction requiring such sources to meet promised emission reductions or be shut down. Another approach that may be useful to legally enforce an offset deal is creation of a tri-party contract. Such agreements would be binding on the existing source, the CA, and the new source. Any party who breaches the contract could, as a last resort, be brought to court and sued for specific performance. But more importantly the contract idea adds to the seriousness of the duties imposed on the parties and forces greater thought regarding the deal about to be entered into. Finally, the CA should be made aware of its duty to provide the community with clean air. Under a public trust notion, the CA will be entrusted with a public resource-- clean air. CA members are merely citizens chosen to serve the public and must always act in a way that furthers community values. When the CA no longer upholds the duties entrusted to it, private citizens should be given the right to go to court and force the CA to act responsibly.

From the state or local perspective, an indirect offset program run by a governmental agency will allow some degree of choice as to how available offsets will be used. The CA will be able to plan economic development in its area on the basis of who will be allocated offsets in a given situation. If the choice is between a relatively clean firm that will provide numerous jobs and a relatively dirty firm that is not very labor intensive, a governmental body may want to retain the option of selling offsets to the firm that encourages the greatest social benefit for the community.

Typically, the CA will purchase offsets in the quantity and type required by the proposed new source. But a situation may arise where it is more prudent to spend the collected fees to buy one type of pollutant offset (say HC) rather than another (say NO_x). This situation may arise where the area for the proposed new source is in marginal nonattainment for one pollutant but serious nonattainment for another. The CA could be granted limited freedom to use funds collected from its indirect offset program to purchase offsets other than those explicitly needed by the new source who paid the fee, provided that the fee is always used to reduce the greatest air-imposed health hazard. Such authority would have to be constrained by definite, quantified criteria (e.g. a showing that monitored air quality values exceeded 100% of the relevant standard for the pollutant offset purchase) before these limited "interpollutant trades" could be allowed.

Summary

An indirect offset system can act as a valuable supplement to EPA's current Controlled Trading programs by reducing the uncertainty that accompanies the embryonic offset market. Theoretically, a fully functioning offset market can ultimately provide the incentive for cost-effective trading and innovation. But the short-term uncertainty is perceived by plant managers to be high, causing them to be reluctant to take the first to step into the new market. Indirect offset fees can be set high enough to avoid disrupting the current direct market and still act as a safety valve to meet mandated offset requirements. A supplementary fee option can provide an important transition between the current command and control approach to regulation and the long-run market-based incentives approach.

FOOTNOTES

1) Air Quality Standards Interpretive Ruling 41 Fed.Reg. 55,524 (1976), revised at 44 Fed.Reg. 3,274 (1979).

2) Clean Air Act 42 U.S.C. §§7401, et. seq., PL 95-95 (1978).

3) The city of Philadelphia is proposing to impose emission fees and to distribute the revenue to certain sources in the area. This information found in the NCAQ report To Breathe Clean Air, at 41-43 (1981).

4) The Central Agency role may be carried out by a pollution control agency, an economic development administration or some other agency authorized by the state.

5) The types of data and studies necessary to implement the Indirect Offset program need fuller discussion.

6) The certainty question needs a lot more study (certainty versus feasibility). There is a tradeoff between price and certainty and the optimum level of each must be discovered. The certainty that arises out of an Indirect Offset program must be greater than what is now available.

7) Certainly the Sohio Corporation believes this. Though the situation in Long Beach was very convoluted with economic, political, and policy problems, it is believed that if Sohio had been guaranteed enough offsets, even at a cost higher than the market price, Long Beach would have ended up with a major oil terminal.

8) It must be pointed out that startup costs will require an initial outlay that may be fairly high. The funds would probably need to come from government agencies as well as the new sources who first participate in the program.